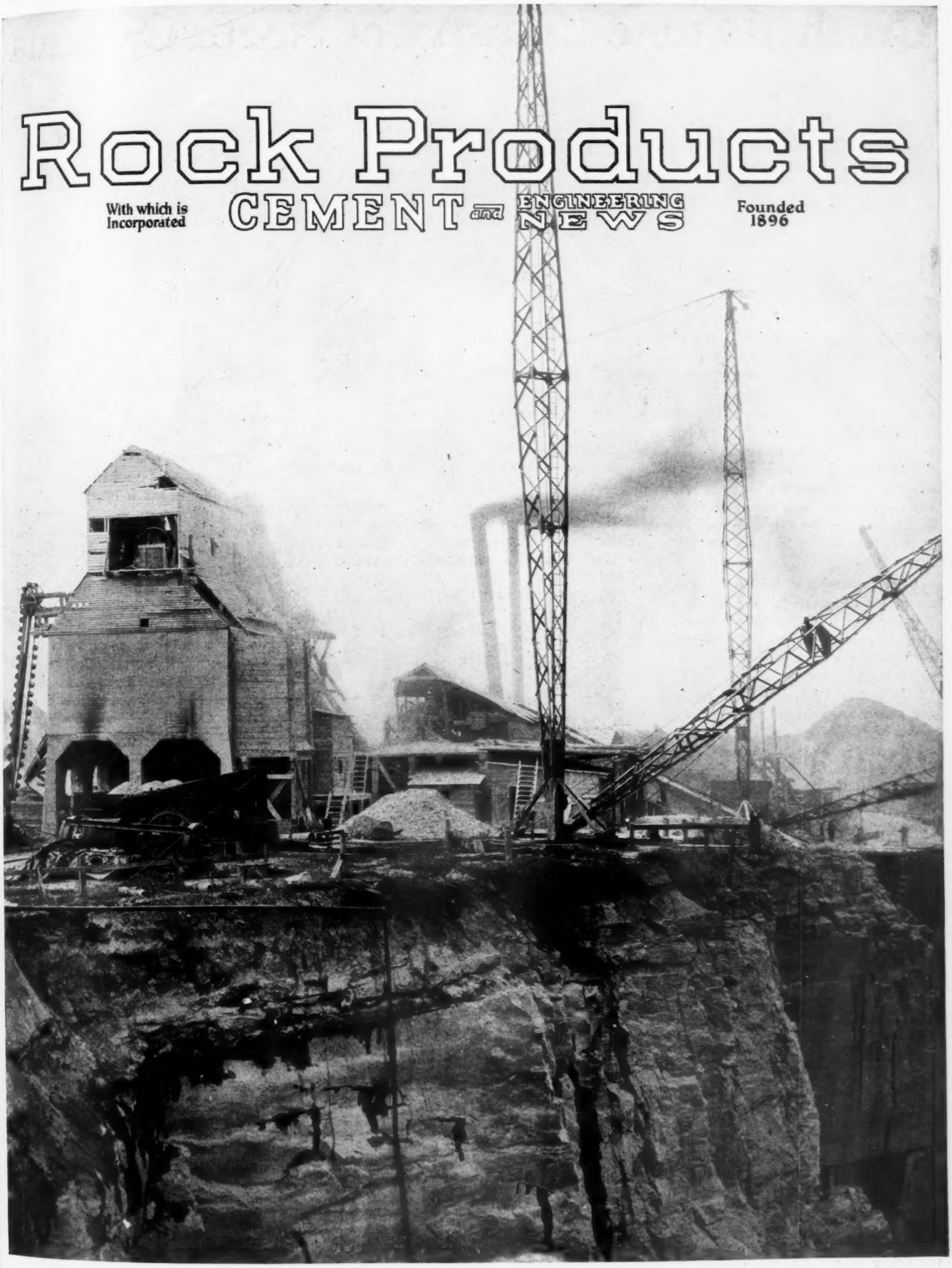
Volume XXX Chicago, April 16, 1927 Number 8

Rock Products

With which is Incorporated CEMENT and ENGINEERING NEWS Founded 1896



Greystone quarry, one of the operations of the Raleigh Granite Co., the largest producer of crushed granite in North Carolina. The face below the plant is 200 ft. high

Crushed Stone Industry of North Carolina

Extensive Hard Roads Program Leads to Development of Granite Quarries in Country Where Good Limestone, Sand and Gravel are Not Easily Available

By Edmund Shaw
Editor, Rock Products

THE rise of North Carolina to a high position among the industrial states of the country has been one of the remarkable developments of the past fifteen years, and the rock products industries have played an important part in that development. This is especially true of the industries which furnish materials for road building, for this state was one of the first to appreciate the economic importance of systematic highway transportation. The population is only 2,500,000, but the state has built a network of roads that connects with every place of any importance. "It is harder to get lost in North Carolina than to find the way in many states," as a slogan on the state road map says.

Bonds amounting to $85,000,000 have been issued and the proceeds spent on the roads. Another issue of $30,000,000 is now available although part of this is to repay loans made to the state by some counties. For maintenance $2,500,000 is spent yearly, and all the money for maintenance and interest and payment of principal on the bond issues is met by license fees and a 4c gas tax. Not all the tax is paid by residents, however, for a great many cars from other states cross North Carolina on their way up and down the coast, and the resorts of the state bring in others.

First Southern State to Build Concrete Roads

The concrete roads of North Carolina are famous, because this was about the first of the southern states to build them. Being somewhat of a pioneer it had to do a great deal of research work, the record of which, in some part, may be found in the printed reports of technical societies. A great deal more that is equally interesting is yet to be published. For the research men from the beginning to the present time have not been guided by precedent and some of the conclusions they have reached are distinctly heretical. If anyone objects they point to the excellent roads that have been built by putting these conclusions in practice, and also they are quite willing to show the long series of laboratory tests from which these conclusions were made.

I was given unusual opportunity to see the roads and the sources of material and was driven over a good many miles of both old and new work by the chief engineer of construction, Mr. Hawkins, and his assistant, Mr. Cockey, Chief Highway Engineer Ames, and the testing engineer, Mr. Giles, gave me a lot of information about the roads and the research work. It would be interesting to report some of the conclusions as to concrete making, but a letter of this kind would hardly seem the place for it. What the writer can abundantly testify to is the quality of the roads, for we drove over many miles in which there was not a crack large enough to be seen from the moving car.

Mr. Ames estimates that 90 to 95% of the aggregate used is crushed rock and by far the greater proportion of the rock is crushed granite. Limestone is produced in

North Carolina State Highway Building at Raleigh

rather small quantity in the state and gravel at only a few places.

The W. W. Bonsal plant, near Lilesboro, is the only large gravel plant, producing 40 to 50 cars daily, although there are some good sized sand operations near Pinehurst. Three are on or near the fall line which divides the piedmont region from the coastal plain. No very good deposits of sand and gravel have been discovered in the coastal plain itself, although it is the opinion of Assistant Professor Prouty of the geological department of the state university that prospecting for sand and gravel might locate some deposits of commercial value.

In 1923 the writer visited the plant of the Standard Sand and Gravel Co. at Lillington, N. C., about 40 miles out of Raleigh. This was producing good sand and gravel at the time, although the bank material was difficult to wash on account of its high clay content. But this deposit is now exhausted.

There was no geological map of the state at the university although the data for one has been collected and is in process of preparation. Prof. Prouty gave me some idea of the geology of the state, working from his notes, especially as the geology bears on the rock products industries. On the piedmont side of the fall line the rocks are old schists, locally called slates, with some exposures of the Cretaceous rocks. An interesting feature of the older rocks is that in one place they contain iron ore which is possibly of the same age, and was formed in the same way, as the Minnesota deposits. As North Carolina is first of all an industrial state, these deposits may some day be important.

Small Plants Prevail

Beyond these old rocks is the great granite area in which Raleigh, Durham and other important towns are situated. The value of this has been principally as a source of road building material. As highways were built rapidly, and in a great many places, the tendency has been to put in a number of small plants rather than a few large plants. The Raleigh Granite Co., the largest producer in the state, owns a number of quarries and has a large total production, although the greatest output from any one quarry is only 22 cars per day. The most extreme example of this use of a number of small tonnage plants is perhaps the business conducted by Collier Cobb, the son of the professor of geology at the state university. He operates six outfits of the portable or semi-portable variety, which is possible because the granite is exposed in so many places that a new location can always be found near the job to be supplied.

Farther west are found those minerals which, although the output is small in tonnage, are so very important commercially, feldspar, talc and mica. Feldspar is worked principally around Spruce Pine and talc near

Glendon and Hemp. I hope to be able to visit these localities and describe something of the methods of mining and preparing these materials before leaving this part of the country.

Limestone appears in the western part of the state but its position is such that it is not so important as a source of aggregate and road building material. The only limestone producers in the state are the Buquo Lime and Stone Co. and the Linville Falls Quarry. There are no deposits suitable for making cement so placed that shipments to the principal consumption points of the state would be easy. There are some marl deposits, but marl is not much in favor as cement material today. Prof. Prouty said he knew of no shell deposits such as have been used as raw material for cement in other parts of the coastal plain country. Lime, limestone and cement are in large part brought in from other states. The state highway department buys the cement for the roads and has regular cement lettings at the same time that it lets construction contracts. Cement is bought from many manufacturers and comes in from the Lehigh Valley, Birmingham, Norfolk, Ragland and other well known cement making localities.

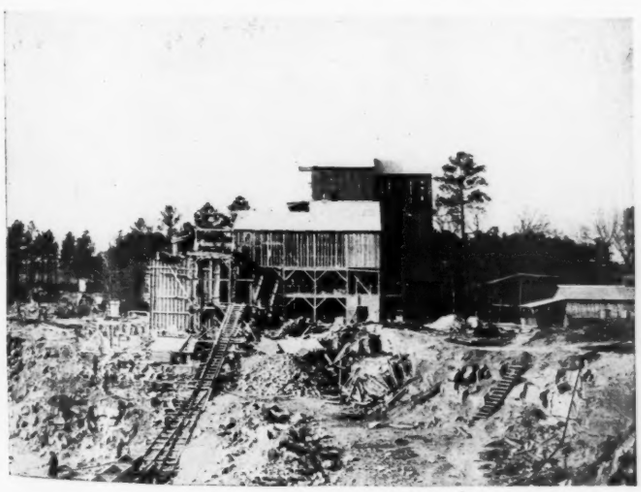
Mr. Hawkins drove me to see a plant crushing granite which was being reconstructed and will probably be in production by the time this is published. It is between Wilson and Rocky Mount and it is owned by the Carolina Road Granite Co., which is controlled by owners of the Virginia Limestone Corp. The principal owners are Charles A. Klotz and George W. Lenzie, both of Chicago, who are well known in the crushed stone business. The property has had a somewhat varied history for this company is the fifth to work it. But the present owners are revising everything and putting in adequate equipment to handle a good sized output, both in the quarry and the plant, so there can be little doubt but that they will be as successful in this enterprise as they have in the others they control.

Granite quarry of the Carolina Road Stone Co. near Wilson. Under the new operating plant the shovel will load into trucks in place of the cars shown here

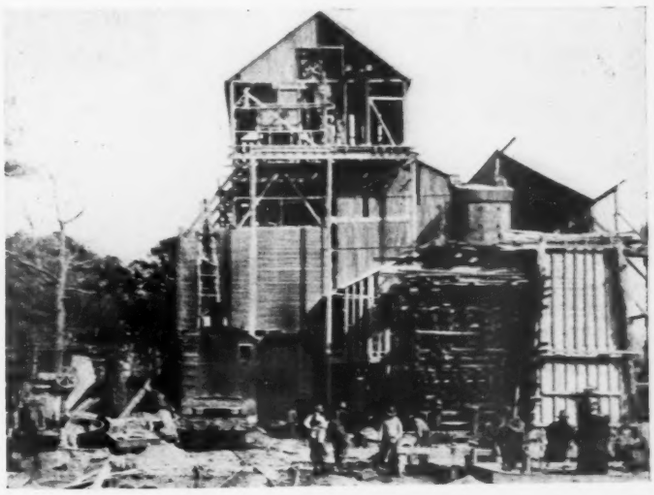
At the time the plant was visited a 48x60 in. Traylor crusher was just being placed on its foundations. The original primary crusher was a 16-in. gyratory of the same make which is now to be used as a secondary crusher. Two No. 5 crushers and a 10-in. reduction crusher, all of Traylor make, will handle the oversize from the screens. The screens are a 60-in. by 18 ft. scalping screen and a 48-in. by 24 ft. sizing screen. The rejections from the scalping screen go to the 10-in. crusher and the rejections from the sizing screen to the two No. 5 crushers. The bins are of a type somewhat unusual in crushed stone plants, as they are made of "cribbing."

It is the system of quarrying that is being adopted that has caused the most comment, as it is so unusual as to be almost if not quite unique. The method used hitherto has been the classical one of loading cars by steam shovel and bringing them to the foot of the plant incline by dinkies. But this system will be abandoned. The steam shovel, a 54-B Bucyrus, will load into 7½-ton Mack trucks which will deliver their loads to pans just below the primary crusher and these will be lifted by a derrick and dumped into the crusher. Knowing that derricks were being abandoned in other granite quarries I asked why this method had been chosen and was told that it had been figured as the best when all the conditions were taken into consideration. As the crusher stands 37 ft. above the ground this method of elevating from the quarry floor is probably as practical as any that could be adopted.

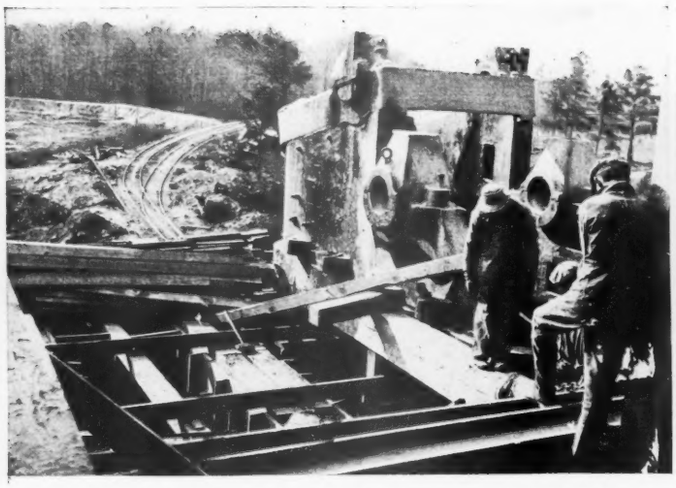
The quarry has hitherto been worked by extending the face as limestone quarries in flat deposits are worked. But this is to be



Rebuilt plants of the Carolina Road Stone Co. still under construction. The concrete foundation for the 48x60-in. jaw crusher shows at the left



End view of the Carolina Road Stone Co. plant. The derrick will stand on the concrete platform shown in front of the new crusher foundation

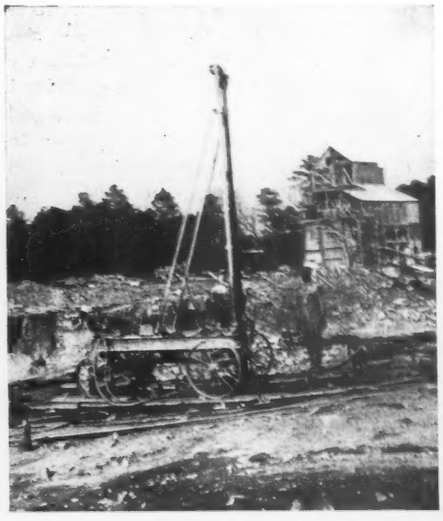


Moving the big jaw crusher on to the concrete foundation at the Carolina Road Stone Co. plant

Power house of the Carolina Road Stone Co. Five full-Diesels and generators producing 910 hp. are installed

changed to working deeper, as is the usual method in granite quarries here. For drilling, Ingersoll-Rand X-70 drills with wagon mounts have been used and their use will be continued. The same drills with tripod mountings will also be used.

The hoist, electrically driven, and the derrick were on the ground and the foundations for them had recently been poured when the plant was visited. Both machines were obtained from the Mundy Sales Corp. A Bay-City Industrial Works crane with a 70-ft.



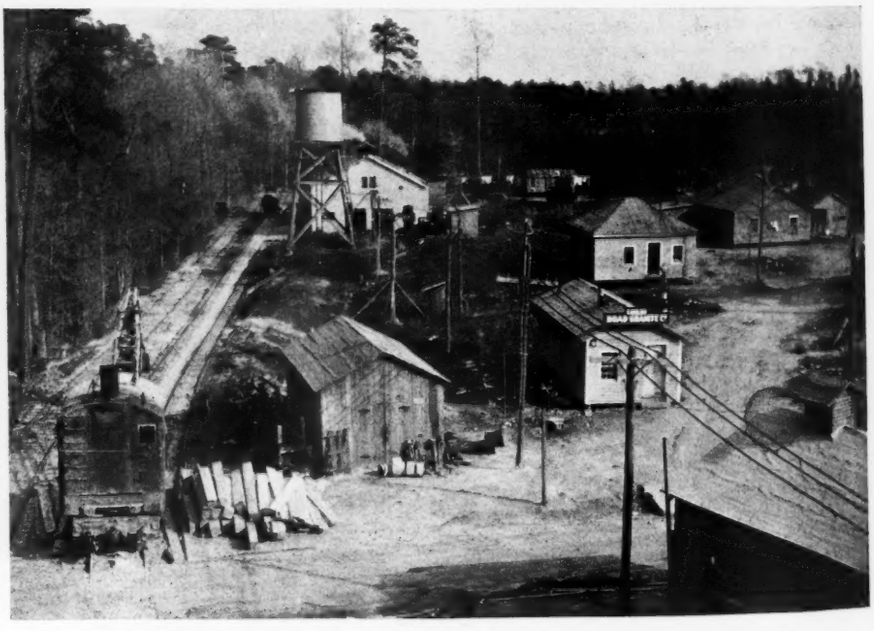
Wagon-mounted drill used at the quarry

boom was being used to place the machinery of the plant.

This operation will be run by one of the most elaborate power installations the writer has seen at a stone crushing plant. The power house contains one 240 hp., one 220 hp., and three 150 hp. Fairbanks-Morse full Deisel engines, each of which is direct-connected to a Westinghouse generator. This building also contains a Chicago Pneumatic Tool Co. compressor which is driven by another Fairbanks-Morse Deisel engine. The motors in the plant are about equally of General Electric and Allis-Chalmers make.

Being so accustomed to think of crushed stone as limestone and trap rock, it has surprised me a little to learn of the economic importance of crushed granite. The production in this part of the country runs into good sized figures. The Raleigh Granite Co., the largest producer in North Carolina, puts out well over a million tons yearly and there are a great many small operations which make a large tonnage in the aggregate. Two large producers in a part of the state I was not able to visit are the Mount Airy Granite Co. and the Salisbury Granite Co., both of which have modern plants. The Hiddinite Crushed Stone Co. is another which has made recent improvements.

When one considers the miles of paved highway that have been laid in North Carolina, it is evident enough that the output must be large, as crushed granite is used in so much the greater part of the highway paving. The railroads are also using large tonnages for ballast. The biggest plant crushing granite I have seen is that of the Trego Stone Co., near Emporia, Va., not far from the North Carolina line. Its entire output goes to the railroads and it is now working on a million-ton order from the Atlantic Coast Line. A description of this plant will be published in an early issue. South Carolina is also a large producer of crushed granite and one of its quarries, that of the Weston and Brooker Co., furnished no small part of the aggregate used in Florida while the building boom of 1925-1926 was on. In a state like North Carolina where limestone occurs in a distant and limited area, where gravel deposits are few and very far between, and where the older rocks are of such a nature that they can hardly be used as aggregate or road material, the economic importance of a large granite area, producing stone of the highest quality, looms up very large indeed.



Looking down from the plant to the office and power house of the Carolina Road Stone Co.

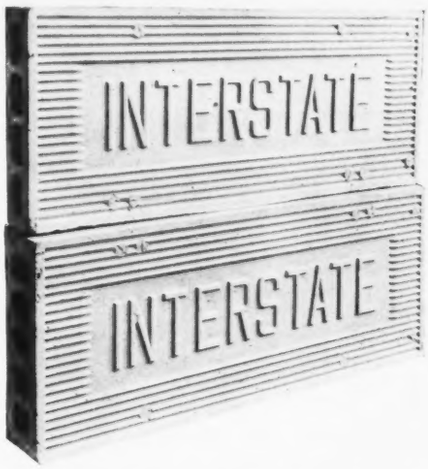
Gypsum Tile from Synthetic Calcium Sulphate

Automatic Control of Calcining Kettles and Dryers Are Features of Calumet Chemical Co.'s Operations at Joliet, Ill.

EVERY year according to authoritative estimates there are produced between 400,000 and 500,000 tons of residual calcium sulphate in the United States. This comes largely from the phosphate fertilizer industry and alkali manufacture, although no inconsiderable proportion comes from other industries such as in phosphoric acid manufacture. A large part of this is at the present time allowed to go to waste, and not an uncommon sight are the enormous piles of residual calcium sulphate near various plants. The problems of profitable conversion have been successfully solved in some instances and at the present time three companies, the Rumford Chemical Co., the Warner Chemical Co. and the Calumet Chemical Co., are putting out tile made from synthetic gypsum.

To the uninitiated it would appear that residual calcium sulphate would be easy to convert to gypsum, but those who have read the article "Synthetic Gypsum—Its Properties and Uses" by R. S. Edwards (ROCK PRODUCTS, February 19, 1927, issue) can readily see what difficult problems had first to be solved before a process for its profitable utilization was developed. And these problems are not all, according to U. C. Young, general superintendent of the Calumet Chemical Co., for every residue from different plants presents its own variable problem which must first be solved. Thus in order to apply the process developed by Mr. Edwards, under whose patents the Calumet company operates, considerable time and money was spent and studies made on the synthetic calcium sulphate of the Joliet plant and the process modified to suit.

The synthetic calcium sulphate produced at the Calumet Chemical Co.'s plant at Joliet, Ill., is of exceptional purity. This is on account of the great care exercised in the laboratory control of mixing of ingredients which go into the production of the phosphoric acid and synthetic calcium sulphate. Accurate control must be kept for the production of a uniform acid and the sulphate benefits accordingly. The washed



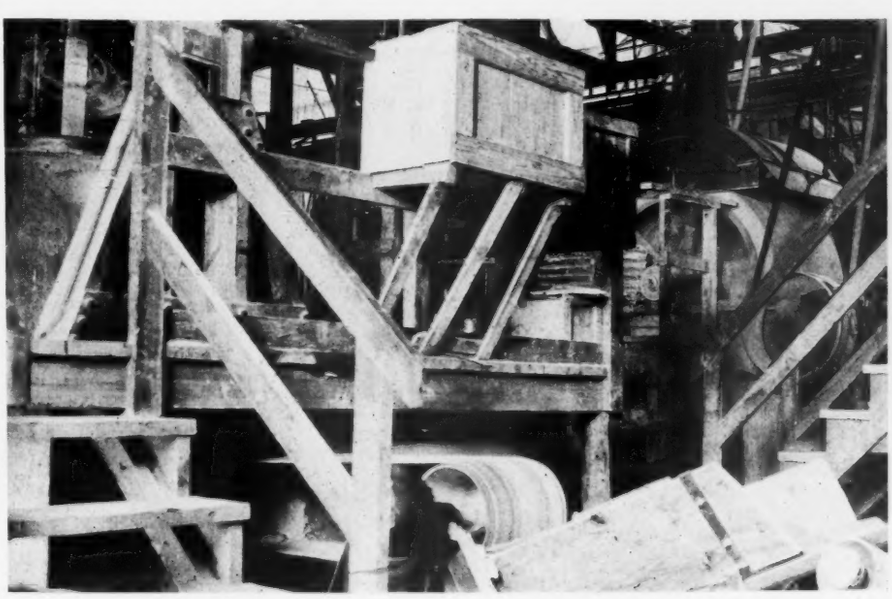
Gypsum tile made at Joliet plant

calcium sulphate sludge remaining after the soluble phosphate liquors have been decanted off is pumped to either or both of two wooden tanks equipped with agitators. This is the beginning of the conversion of the byproduct sulphate to a synthetic gypsum.

To the sludge in the tanks, a suitable neutralizing agent is added, the agitators set in motion and the mixture brought to a temperature of about 140 deg. F. At different intervals tests are made and more alkali or sludge added, dependant on the acid or alkaline reaction of the material. The final mixture, however, leaves the tanks as slightly acid and this acidity is removed at a later stage during filtration.

From the neutralizing tanks the slightly acid mixture is pumped to an Oliver continuous filter which is equipped with a hood to carry off steam. This filter is in the form of a hollow drum, 6 ft. in diameter and about 48 in. wide, which is slowly rotating. The circumferential surface is really a suction box and is perforated with vacuum connections to the perforations, the perforated area covered with a filter cloth. The operation is simple, the filter drum on rotating through the collected sludge picks up some of it on its surface. The water in the sludge is drawn through the cloth by a vacuum and runs off to the sewer. An even, dewatered layer 1 in. in thickness is built up on the drum surface, and as the drum rotates this is washed with sprays of hot and cold water to remove any soluble salts. This washing is very important and beneficial in that it prevents any possibility of efflorescence in the finished gypsum block. At a point opposite and on the other side of the wheel this layer of dewatered sludge is removed by scrapers and falls into a hopper, where after mixing with water it passes to two correction tanks. The cleaned wheel surface continues on its way to the sludge pit, where it collects another layer and the process repeats itself as before. The material as it leaves the filter contains about 40% water. One 20-hp. electric motor drives a line shaft from which the above equipment is run.

The two correction tanks are directly connected



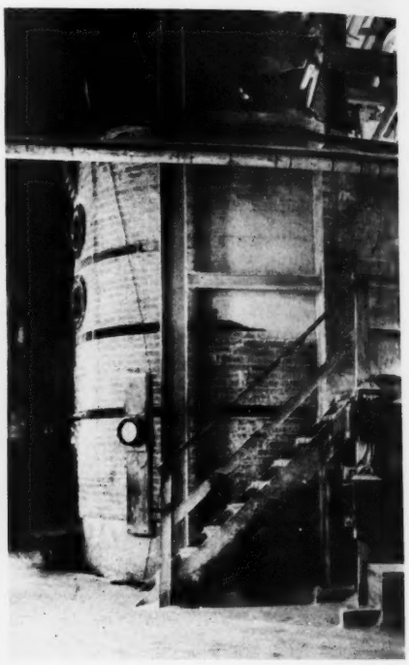
Interior view showing one of the centrifuges at the left and the filter drum at the right background. The conveyor running underneath the centrifuges is shown discharging to the conveyor delivering to wet storage bins

with one another and a constant recirculation of the material carried on so as to ensure a uniform product. Sufficient water is then added to the material to make a 50% sludge, which after a short recirculation in the tanks is pumped to either or all of three centrifugal machines manufactured by the Tolhurst Machine Works, Troy, N. Y. These centrifuges are driven from an overhead shaft connected through individual countershafts to a 25-hp. electric motor. When all the machines are running at full capacity and speed only 15 hp. is said to be sufficient for their operation. The centrifugal baskets are cylindrical in shape with perforated sides and bottoms. The sides are lined with filter cloth over which is placed wire cloth, ¼-in mesh, for protection of the cloth during scraping. The machines may be operated individually or together. Friction cones and pulleys on the main driving shaft allow different speeds on each machine. The usual speed during operation is about 800 r.p.m.

To feed the machines the operator opens an overhead valve on the sludge line (from the correction tanks) and allows the sludge to strike the rotating centrifuge at an angle to the sides. The usual amount put in at one time is from 500 to 700 lb. and the machine and load rotated for about 15 minutes at 800 r.p.m.

At the end of this time the operator slows down or stops the centrifuge, removes the bottom plate and puts in the scraping attachment. This attachment works up and down on a screw as the machine rotates slowly and scrapes the adhering layer of centrifuged material from the basket sides. The loosened material drops through the open bottom to a conveyor belt where it is carried to the raw storage bins. The layer is usually from 3 to 4 in. in thickness on the sides before scraping and carries about 12% water.

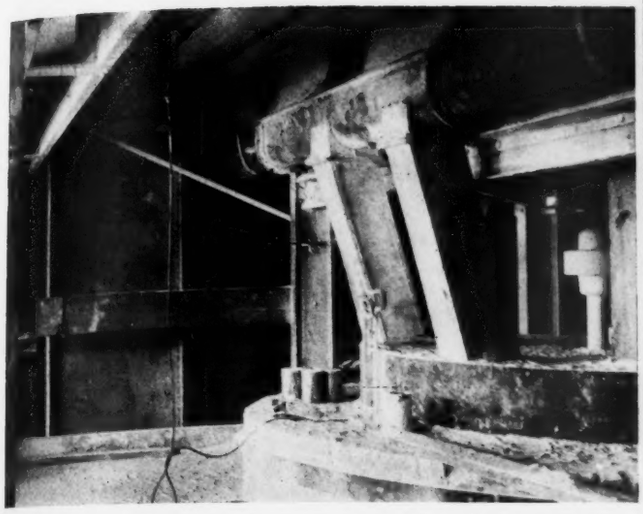
As explained by Mr. Edwards (Rock Products, February 19, 1927, issue) this centrifuging action is of the greatest importance, for through it the very necessary change in crystal structure is brought about. Microscopic examination of the material before centrifuging shows that the crystals are small and irregular; on calcining a plaster of irregular set and low strength results. The same material after centrifuging possesses large crystals and the resulting plaster has good initial and final set and excellent strength. Undoubtedly the tremendous force exerted during the centrifuging process has compacted and densified these crystals. The microscopic examination also shows that the crystalline structure is in many respects quite similar to that of natural rock gypsum, one noteworthy feature being that the crystals are much larger than before centrifuging.



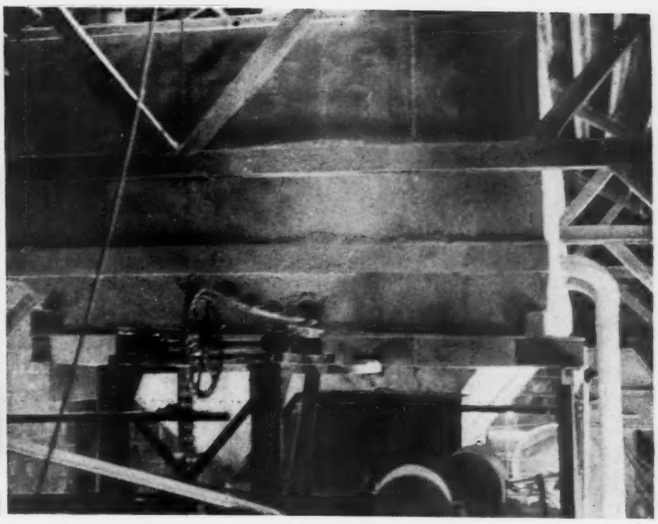
One of the calcining kettles showing the continuous recording thermometer around which the kettle control system has been developed

Close-up of the centrifuges showing the construction and drive

Just what role the neutralizing agent plays in the conversion process is rather difficult in some ways to explain. Edwards says that it is necessary to neutralize the small amounts of phosphoric acid present because investigations show that as such it is one of the most harmful materials, destroying the setting properties and strength. All this is true, but some work done by R. S. Dixon, chief chemist at the Calumet plant, seem to show that the effect of alkalies is somewhat more than the above. Mr. Dixon's tests show that with the residual calcium sulphate of the Calumet process a good gypsum tile can be made without neutralizing



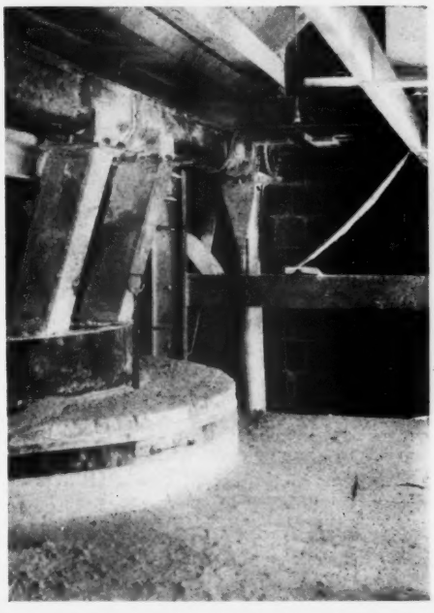
Top of kettles. The bucket elevator (left) carries material from wet pit to horizontal trough. A drag conveyor running in the trough feeds the kettles through the two vertical ducts



Dust catcher above kettles. The drag-chain conveyor feeds material to the kettles and also carries settled dust to a return pipe leading to the hot pit

before centrifuging. At the same time, gypsum tile made from neutralized sludge shows increases of strength above that expected as compared with tile made from unneutralized sludge. This leads one to believe that the alkali exerts some other effect on the structure besides acting as a mere neutralizing agent.

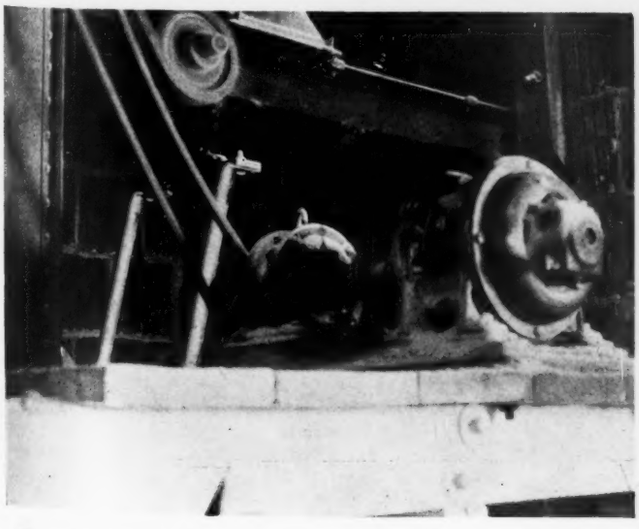
The raw storage bins are of steel and were made by the company. They hold about 40 tons of the wet material. At the bottom of the bins are four bin gates from which material is drawn as needed. A specially designed conveyor belt running along the length of the bins is used to carry the material to a pit alongside the calcining kettles. This belt replaces a screw conveyor first installed but later removed because the wet material choked in it. From the pit the material is carried by a belt and bucket elevator to the top of the calcining kettles. A 3-hp. 1160-r.p.m. electric motor operating through a D. O. James spur gear speed reducer (4:1) runs the elevator. The kettle feed is by a drag-chain conveyor operated by a 3-hp., 1160-r.p.m. electric motor through a James speed reducer of 137:1.8 ratio.



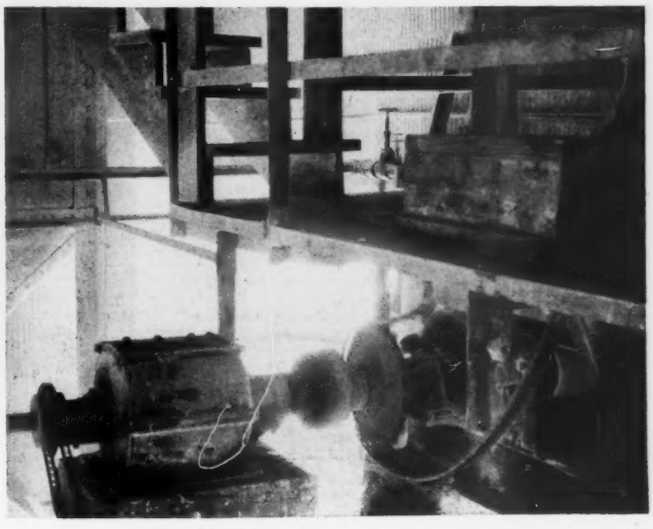
Another view above the kettles showing the feeding arrangement

The two Ersham calcining kettles are of large capacity, with the usual surrounding masonry and fire box. Over each kettle and forming an integral part of the calcining system is a large sheet metal box which serves to catch dust in the hot vapors coming from the kettles. The gypsum is fed to the kettles, as previously stated, by a drag-chain conveyor. Through this a regular and automatic feed is maintained.

One of the unusual features of the calcining operation is the substitution of continuous recording thermometers for the observation method of determining when first settle was reached. Each kettle has one of these Brown thermometers and the data recorded on its serves not only as a check on the kettle operation but as the basis for a complete and simple control system. Reduced in simple terms, the system calls for the batch to be dumped when the thermometer records a temperature of 300 deg. F.



Electric motor driving through a spur gear speed reducer which runs the bucket elevator



Spur-gear speed reducer which is part of the drive system controlling the feeder and soak belt

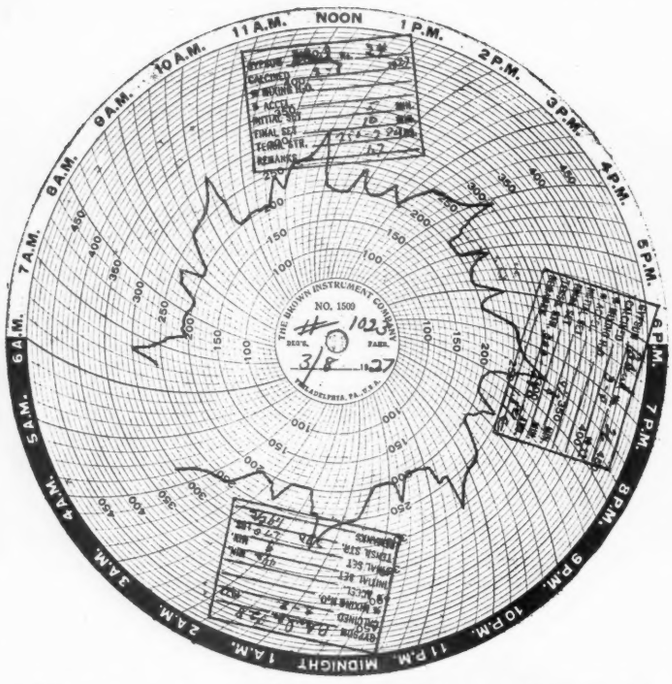


Chart from the recording thermometer installed on the calcining kettles. The data below are taken from this

The dumping temperature of 300 deg. F. is peculiar to the material being calcined at the Joliet plant, and was determined by extensive experimental work in the laboratory and on the kettles. These tests all indicated that at this temperature the material contained from 6 to 6½% of combined water, the correct amount for plaster of paris ($CaSO_4 \cdot \frac{1}{2}H_2O$). To continue calcining was not only dangerous to the plaster properties of the material, but was also a waste of heat. The accompanying illustration shows one of these charts on which a 24-hr. kettle record appears. To the experienced reader they tell quite a story. For example, the curves for a complete cycle show:

Time	Temperature (deg. F.)	Remarks
10:15 a. m.	300	Calcine completed, kettle dumped.
10:15-10:45	300-200	Feeding new material.
10:45-11:30	200	Feeding completed—unusually regular feed.
11:30-12:15	200-260	Free water passes off—calcining begins.
12:15-12:45	260-300	Calcining uneven—firing irregular.
12:45	300	First settle—batch dumped.

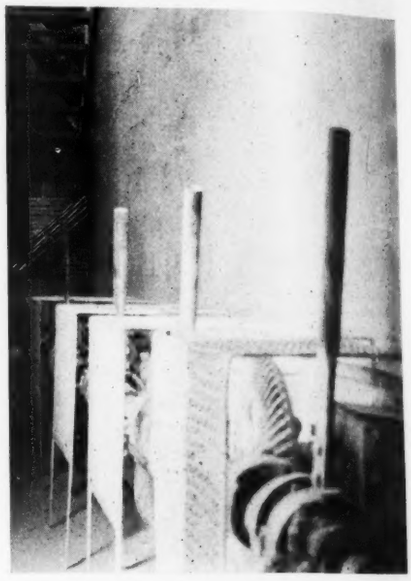
The reactions taking place in the kettle are:

$$CaSO_4 \cdot 2H_2O + nH_2O \rightarrow CaSO_4 \cdot 2H_2O \rightarrow CaSO_4 \cdot \tfrac{1}{2}H_2O$$

The advantages of this method of kettle control are quite apparent—the trained man to watch the kettle is eliminated and the plaster made more uniform in quality than by the old method.

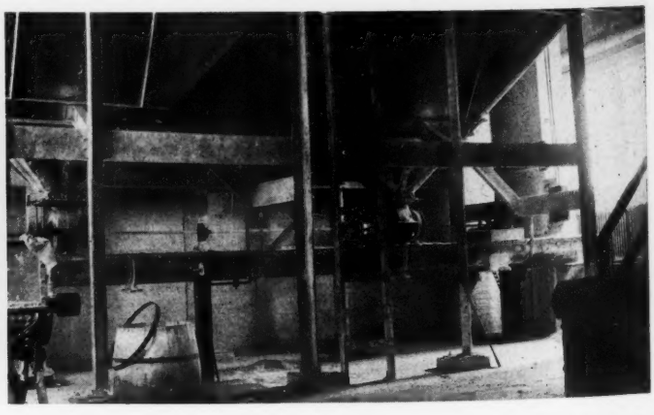
The calcining process completed, the kettles are drawn and the hot material allowed to fall to "hot pits," which are merely storage bins of about 40 tons capacity. The plaster is drawn as needed from either or all of four gates at the bottom and carried by a screw conveyor to a pit from which a belt and bucket elevator raises it a screw conveyor running to the plaster storage bins in the mixing room. There are two of these hoppered steel bins, both equipped with mechanical feeding devices through which the plaster is fed to a screw conveyor emptying into the boot of a chain and bucket elevator driven by an electric motor through a spur gear speed reducer. This elevator discharges to a screw conveyor, delivering to a feeder device installed at one end of the soak belt. The feeding device is controlled in its rate of feed by the driving arrangement that drives and controls the rate of speed of the soak belt. Spaced teeth on the bottom of the feeder comb the stucco on the belt into furrows so that permeation of the water is more thorough.

The soak belt and stucco pass through a water bath kept at a constant level. The bath is formed on the belt itself, the midsection of which is depressed so that it acts as a trough. The water is kept at constant level through an automatic device which controls the water supplied to the belt. This consists of a float to which one end of a rod is fastened and whose other end is hinged to a supporting timber. Excess water on the belt causes the float and rod to rise; the hinged rod member strikes a spring contact point on a "Tycos" pressure regulator. This meter regulates the amount of air passing to a diaphragm. Forcing the contact point up turns on the air supply to the Taylor diaphragm lever meter and causes it to expand, a movement which is transferred through a connecting rod to a clamp on a flexible hose section of the water line feeding the soak belt. The clamp closes about the hose; the water supply is cut off until



Arrangement at rear of plaster bins through which material is drawn

Discharge gates at raw storage bins. Note the roller supports of the conveyor belt carrying the discharge to the pit

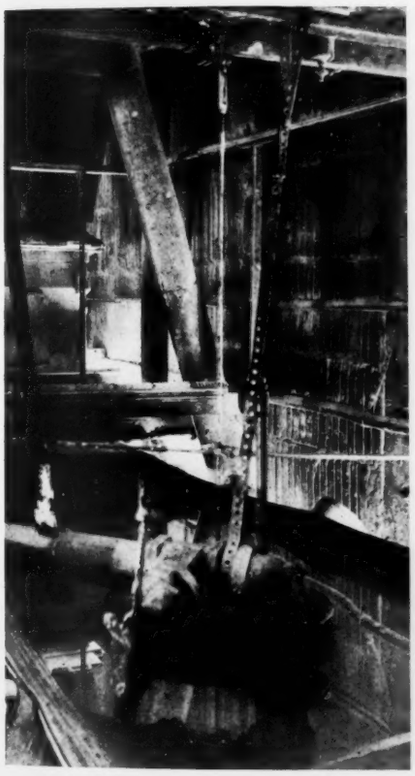


Plaster storage bins in the mixing rooms with mechanical feeders at the bottom for delivering plaster to the screw

Wood fibre storage along the sides of the tunnel kilns

Blower and pipe arrangement carrying fibre to hopper

low water on the belt permits the float to sink and break the contact of the float rod and the Tycos regulator; air is once more cut off from the diaphragm and it contracts to its former position, releasing the rod actuating the hose clamp, and the water again flows freely to the soak belt. This arrangement was worked up by the company

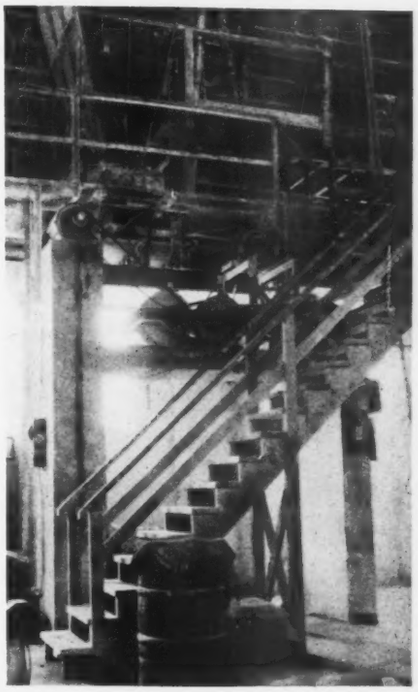


Soak belt and float which regulates amount of water delivered to it

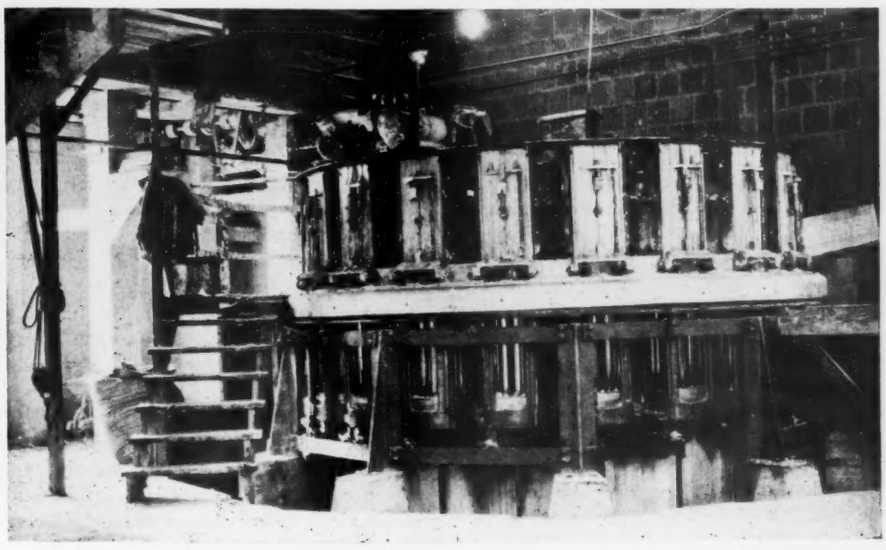
and is said to have given good results, the water never once overflowing the belt since it was put into use.

The soak belt passes out of the water section and underneath wood fibre and accelerator hoppers. The accelerator is dropped on the plaster by a small belt running in the bottom of the hopper. Fibre is fed to the soak belt by a belt with spikes that runs along the bottom of the fibre hopper. The proportions of these materials is maintained through the same driving arrangement that controls the feeder and the soak belt. The wood fibre is blown into the hopper by a Sturtevant planing mill blower and pipe arrangement.

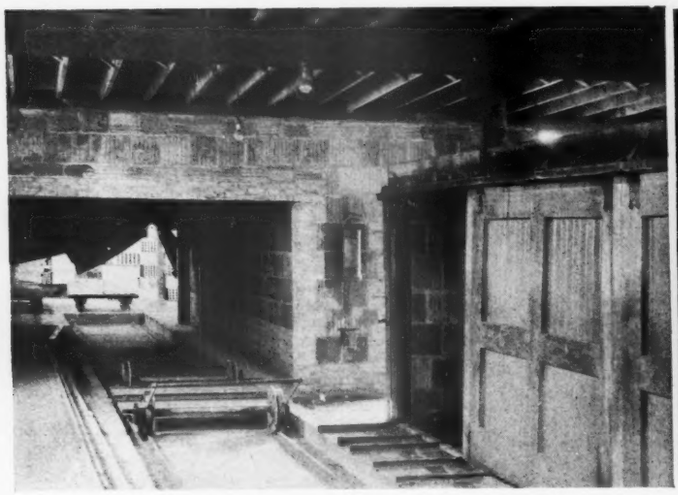
The contents of the soak belt are now deposited on a narrow troughed belt conveyor running at right angles to the soak belt. This delivers to the mixer where the stucco, wood fibre and accelerator are given a thorough mix. This mixer is a development of the Gypsum Engineering and Manufacturing Co., Chicago, and is of the continuous type, automatic in operation. It holds enough material to fill one mold on the rotary gypsum block machine and its operation is so regulated with the speed of the machine. It can be operated independently of the machine, however. The soaking belt, cross belt, stucco feeder and accelerator and shavings feeder are all driven by a 3-hp. motor connected by gear, chain and sprocket to a Reeves variable transmission drive which in turn is connected to a spur gear speed reducer. This operation is controlled as a unit and with the mixer and rotary molder is under the control of the man at the molding machine.



Combination drive which operates the soak belt and material hoppers



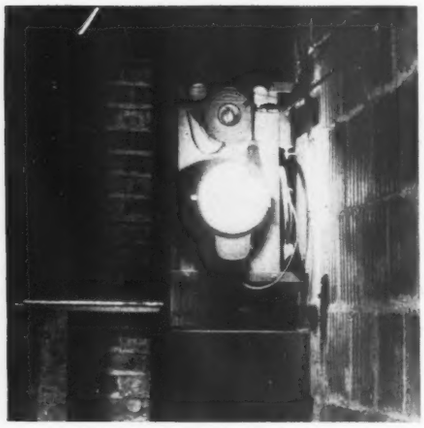
Rotary gypsum block molding machine. The operator controls this machine and the soak belt as a unit



Dry end of tunnel kilns. The cars are pushed on to the transfer truck and run to storage

Loading tracks before the wet end of the dryer tunnels. The control instruments show at the far right

The molder is a "Gibraltar" rotary block machine manufactured by the Gypsum Engineering and Manufacturing Co., Chicago. It is 12 ft. in diameter with 20 vertical molds evenly spaced about its circumference. Since a description of this machine has been published at various times in ROCK PRODUCTS, the bare essentials of its operation will suffice in the present instance.



Thermometer control at the furnace regulates the temperature of the air delivered to the kilns

As the machine slowly rotates, an open mold is brought before the mixer and the operator allows the material to discharge into it. The molds are previously sprayed by automatic devices with an oil mixture to prevent the plaster from sticking to the molds. The cores slowly and automatically raise so that when the mold is filled the pins are up. Excess material on top of the molds is scraped off by a workman, the cores and division plates start downward and at a point near the filling position the mold automatically opens and the block are removed by hand. The entire operation is automatic, the recession of the cores starting about the time the initial set is completed. The machine is regulated previously so that about one revolution is made in the time it takes for the plaster to complete its final set. The molds are interchangeable so that several different widths of block are possible by merely changing the number of units to each mold. At the time the plant was visited both 3-in. and 4-in. block were being made.

The green tile is taken from the machine and placed on steel frame cars holding about 66 of the 3-in. block. After the cars are loaded they are moved by transfer cars to the storage tracks before the tunnel dryers, of which there are three with two tracks each. The cars are pushed by hand into the tunnel dryer, one at a time, first a car of dried block being removed from the other end of the dryer. These kilns are 105 ft. long and hold about 90 cars or 6000 ft. of tile. The time for drying is about 24 hr., which is equivalent to 9½ hr. production of the molding machine.

Dryers

The kiln dryers are heated directly from a coke fire located in an adjoining building, the gases from which are mixed with air returned from each end of the kiln, together with fresh make up air.

Dampers located in the return air duct at each end are controlled by Tycos pressure regulators which are operated from the wet and dry bulb temperature controllers. When a certain maximum humidity is reached at either end the dampers are automatically closed and force the air out through vents located at each end.

When this humidity drops they open and again allow the air to circulate back for mixing with the furnaces' gases.

The mixed air is drawn from the furnace by a Sturtevant fan and sent to the kilns at a point slightly nearer to the wet end than to the dry.

The temperature of the ingoing air is maintained by a thermometer control operating on a forced draft fan forcing air under to a coke fire. The suction of this fan takes in air at room temperature and forces it down through the hollow walls of the furnace which not only keeps the furnace walls cool, but preheats the air being used for combustion.

The following will better illustrate some of the automatic control features incorporated in this dryer system:

The hot air is introduced by means of an overhead insulated metal duct across the top of the kilns, with openings to discharge the heated air downward over each line of trucks and at a point 34 ft. from the wet end. The air then flows towards the ends of the tunnels in each direction.

At each end of the tunnels is an exhaust stack for discharging vapor laden air, the wet end stack being much the larger. There are openings in the bottom of the tunnels connecting with concrete ducts leading to the mixing chamber between the fan and heater. By means of a system of dampers any desired amount of air may be recirculated and used over again, the balance passing out the stacks.

These dampers are controlled automatically by means of thermostats located near the end of the tunnels, set to give a temperature of about 140 deg. F., and serve also to control the humidity at each end. The recirculated air averages about 50% of

Loading gypsum tile from storage for truck delivery

the total which results in a desirable fuel economy.

The heater is of the direct type, made of fire brick, burning coke as a fuel, and the gases and products of combustion are circulated through the dryer. This gives an extremely high economy, the only disadvantages being a small amount of grayish ash from the coke deposited on the blocks. A small motor-driven blower supplies the air for fuel combustion, under the grates, and the temperature of the air delivered to the tunnels is controlled automatically by a thermostat in the duct operating a damper on the forced draft fan. This control is usually set at 200 deg. F., and is surprisingly accurate, the temperature curve on the recording thermometer varying but little.

There is a steel plate mixing chamber between this heater and the large circulating fan, where the hot fresh air from the heater is mixed with the recirculated air from the dryer, and passes into the fan inlet. The fan is a No. 14 Sturtevant Multivane, capacity 85,000 cu. ft. of air per minute, and is belt driven by a 50 hp. motor.

After leaving the tunnel dryer the cars are pushed to the warehouse which has a capacity of about 250,000 sq. ft. Here they are unloaded and stacked for storage, or picked up on a Yale electric lift truck which carries them to freight cars alongside of the warehouse, where they are loaded.

The entire output of tile made at the plant is marketed by the Interstate Fireproofing Co., Chicago.

Rate of Drying of Wall Plasters

IT has been long recognized by interior decorators, plasterers and paper hangers that freshly plastered walls and ceilings must be thoroughly dried before they can be decorated successfully. As a superficial examination of a plaster cannot be depended upon to disclose with any degree of accuracy the percentage of water remaining in the plaster, it was decided to determine the time required for drying of those types of plaster in common use under different conditions of temperature and humidity.

Panels of plaster about 4x6 in. and held in wooden frames are suspended from a balance arm by means of a wire which passes through a small hole in the top of a cabinet. The loss in weight of the plaster through evaporation of water is recorded, and the plaster is considered dry when its weight remains constant over a period of 24 hours. Air is provided through a suitable opening in the cabinet at a constant velocity of 80 cu. in. per minute. Constant temperature is maintained by a thermostatic regulator.

Determinations have been made at temperatures of 22, 30 and 37 deg. C. (71.6, 86 and 98.6 deg. F.), using air of about 65% and 90% relative humidity. The proposed program calls for another series of measurements at 15 deg. C. (59 deg. F.), which has not yet been completed. The following plasters have been tested:

Illustrating one of the structural types in which gypsum tile from the Calumet Chemical Co. was used

Kind of plaster	Coats	Thickness	Finish
Gypsum	2	½ in.	Sand float
	2	⅞ in.	Sand float
	3	½ in.	White
	3	⅞ in.	White
	*	1¾ in.	Sand float
Lime	†	†	†
Cement	2	½ in.	Sand float
	2	⅞ in.	Sand float
	*	1¾ in.	Sand float

*Back plastered, 2-coat.
†Same as gypsum.

The mixes used conformed to the recommendations of the American Society for Testing Materials for gypsum plasters, the National Lime Association for lime plasters and the Portland Cement Association for cement plaster.

The work completed indicates that the temperature of the surroundings exerts the greatest influence upon the time required for drying of plaster. Thus a ½-in., two-coat, sand float finish gypsum plaster has been found to dry to approximately constant weight at 22 deg. C. (71.6 deg. F.) with air of 65% humidity in 80 hours; at 30 deg. C. (86 deg. F.) the drying time is reduced to 40 hours, and at 37 deg. C. (98.6 deg. F.) to 25 hours. Approximately the same ratio holds true for other thicknesses and other plasters. Increasing the humidity materially prolongs the drying time. Thus from 125 to 200 hours more time is required for "drying" of similar plasters at 95% relative humidity than is necessary at 65% humidity with the same temperature in each case. The time of drying also varies almost directly as the thickness of the plaster. The three-coat plasters dry somewhat slower than do two-coat plasters of the same thickness dried under similar temperature and humidity conditions. This phenomenon is probably due to the slower rate of diffusion of water through the comparatively dense white finish coat which is applied to the three-coat specimens.

It is believed that the data which will be available upon completion of this work will enable decorators to proceed with increased confidence upon the task of painting or papering plastered walls.—*Technical News Bulletin*, U. S. Bureau of Standards.

Talc Deposits of Canada

A COMPLETE report on the talc deposits of Canada has been recently issued by the Geological Survey, Department of Mines, Canada. It is based on a geological examination of all the known deposits in the country and deals chiefly with the distribution, general relationships, supplies and commercial possibilities of talc and soapstone in Canada. The report is considered as a complement to a previous bulletin by H. S. Spence on "Talc and Soapstone in Canada," published in 1922, which deals mainly with the technology of the mineral, although brief descriptions are included.

The talc in Canada with a single exception falls into three classes. These are:

(1) White or light grey, high grade talc associated with dolomite. The deposits of the Madoc district, Ont.; those near Mt. Whymper, B. C., and the Gisby group near Chamoux, B. C., belong to this class.

(2) Grey or green (usually impure) talc associated with basic igneous rocks. Deposits of this class are very numerous in Canada. Some of the most extensive are located near Trout Lake, B. C.; Kenora district, Ont.; Hastings county, Ont., and soapstone deposits scattered throughout a wide belt in the eastern townships of Quebec.

(3) Micaceous talc in veins cutting soapstone or serpentine. The micaceous variety is found in two localities, Hastings and Megantic counties, Ont. The deposits are not sufficiently extensive to be workable.

Further details on the general character and origin of talc deposits in Canada and discussion of the origin hypothesis are given in a chapter of the bulletin. A description of the deposits, extent to which they have been developed, and general data on the companies operating in the districts form a comprehensive part of this survey. General statistics covering talc and soapstone in other important producing countries with particular reference to the deposits in the United States and other data on Canadian production, export, consumption, etc., are found in the last chapter.

Copies of the bulletin can be obtained at 25 cents each from W. H. Collins, director, Geological Survey, Department of Mines, Canada.

Excavation system at the Dixie Sand and Gravel Co.'s operation near Petersburg, Va. The dragline stands at the center of a semi-circle to give the greatest working area

Two Virginia Sand and Gravel Operations

Dixie Sand and Gravel Co. and the Petersburg Sand and Gravel Co., Work Deposits Near Petersburg, Va.

NEAR Petersburg, Va., is one of the few localities in which sand and gravel occur in deposits of sufficient depth and area to permit working on a large commercial scale. Several companies operate near Petersburg and two, the Petersburg Sand and Gravel Co. and the Dixie Sand and Gravel Co., are under the same financial control. The Dixie operation is the largest and it has a comparatively new plant to which some fairly recent improvements have been made.

The coastal plain deposits of the southeastern states seem rather shallow and "spotty" to one who is familiar with the deep deposits of the glaciated area. The Dixie deposit, however, is exceptionally uniform and wide spread. It averages 20 ft. in depth and does not vary much anywhere from this average. Workings have opened it for a mile in length and a large proven area remains to be worked.

No stripping is required. The trees which grew upon the land have been cut down and the remaining roots are either cast aside or picked off at the plant. Roots do not go to any depth, so that the cost per ton of picking them off is not excessive.

The ground is worked systematically by a dragline excavator, a Class 14 Bucyrus with a 60-ft. boom. A 2-yd. Page bucket is employed, armed with manganese steel yoke, lip and teeth. The working follows closely the method developed in the flat deposits of the Tennessee phosphate fields, and in other places where large areas are to be excavated. The ground is first opened by a long cut, the full length of the property and then the dragline returns along the side of the trench. The machine always stands at the center of a semi-circle so that the largest amount of digging area is available for each position of the machine. A sketch shows the relative position of the dragline and the car that is to be filled.

Stangard gage track and equipment is used to transport the material to the plant and the track is well-laid, 85-lb. rails being used. Two locomotives, a 34-ton American, and a 38-ton Baldwin are used in this and other work about the plant. The ground is almost level so that no difficulties in track laying and maintenance are encountered, although a few low spots had to be filled to bring the track up to grade. This work was done by the dragline.

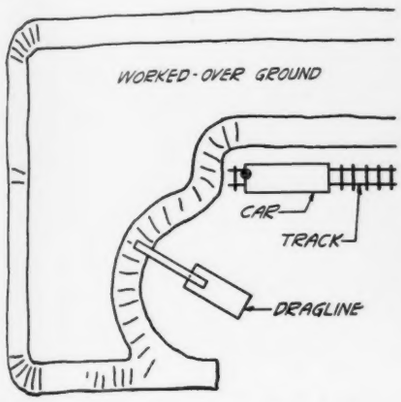
The hopper into which the cars are dumped is of concrete and octagonal in section. This shape was adopted so that the track could be brought in and over the hopper from more than one direction, for it is calculated that there will be about five different positions for the track before the deposit is worked out. This unusual foresight will considerably simplify the track laying in the future.

The hopper is covered with a grizzly of 85-lb. rails 14 x 14 ft., the rails being laid bottom up with 6-in. to 8-in. clear openings. Any boulders which will not pass these openings are thrown out, but as such boulders are few in number the accumulation is not great. Some sales of these have been made to those who wanted one-man size stone for such uses as "cyclopean" concrete.

The hopper sides converge and below the hopper is a concrete chamber in which a pan feeder works. This was designed and built at the plant by J. A. Mallory, Jr., the superintendent. The pan is driven back and forth by an adjustable eccentric which can be set to give any throw from 2½-in. to 6-in. The feeder is driven from the lower shaft of the belt conveyor by chains and sprockets.

The belt conveyor which takes the ma-

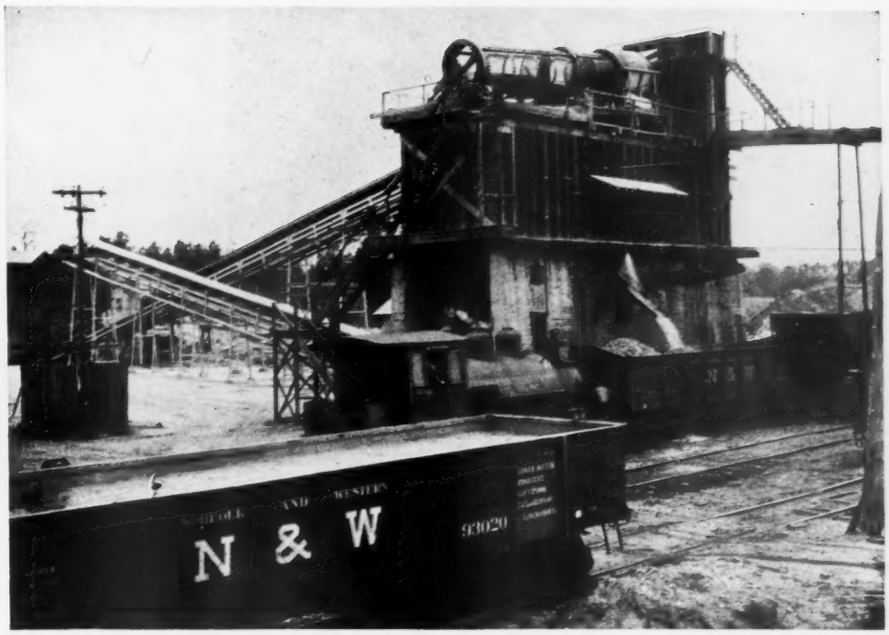
terial to the plant is 24-in. wide and 196 ft. long on centers. It is supported on a neat steel frame, built at the plant of pipes and angle irons. This belt is interesting because of the way the drips are handled. The material dug by the dragline is quite wet and water and sand fall from the belt on the under side. Sprays are used to clean the belt which adds to the dripping. All the drips fall into a trough below the belt and run down to a small pond on the other side of the hopper from the plant. The sand caught in this pond is of good quality and is occasionally excavated and sold. Twelve carloads had been dug out just before the plant was visited.



Ground working system at Dixie plant showing the relative position of the dragline and car to be filled

A small house built over this belt shelters the picker who lifts off any roots or lumps of clay that he finds on the belt. These are dropped into a car below and later sent to a waste pile.

Standard Jeffrey drive and troughing idlers are used on this conveyor but the return idlers are made at the plant of extra heavy pipe. Castings are screwed into the ends of the pipe to hold the journals which turn in babbitted bearings with grease cups. These idlers have been very satisfactory and none have ever stopped in service. The belt, made by the Cincinnati Rubber Co., has lasted the three years that the plant has been running without showing undue wear.



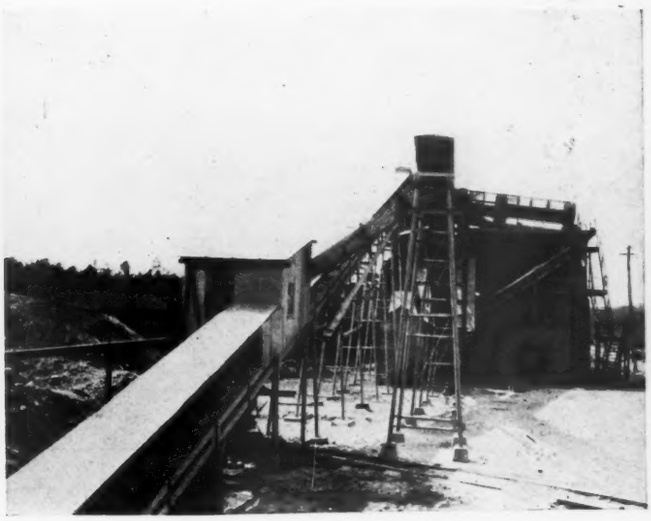
Dixie Sand and Gravel Co.'s plant showing the long screen, 30 ft. by 60 in.

The single screen of this plant, of Good Roads make is almost unique in sand and gravel practice as it is 30 ft. long and 60 in. in diameter. It goes almost the length of the three 14 ft. square bins so that the products can drop into them directly without chutes. The perforations are ½-in., ¾-in. (or ⅞-in. for a special size) 1¼-in., 1½-in., and 2½-in. Mixed sizes are largely made, especially a mixture which is used for highway work in both Virginia and North Carolina. The plant ships into both states. The sand jacket of this screen has ⅜-in. holes.

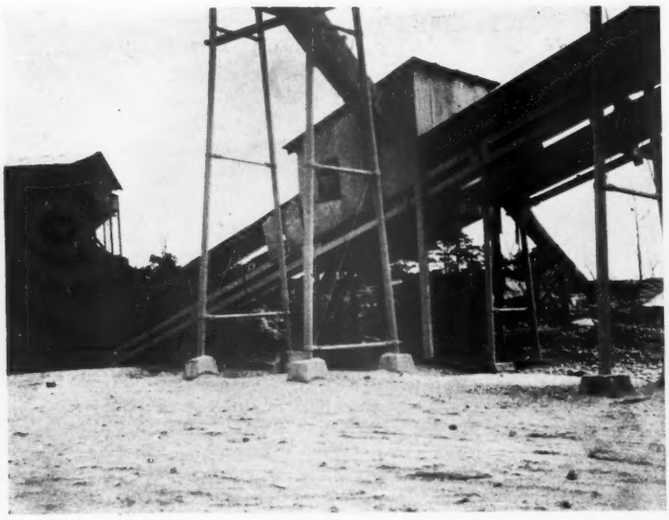
Oversize of this screen goes down a chute to a No. 6 "Champion" jaw crusher. The crusher discharge goes to an inclined belt which elevates it to the main plant belt by which it is returned to the screen. This belt uses the same sort of drive and idlers as the main plant conveyor belt.

Plant hopper at Dixie plant

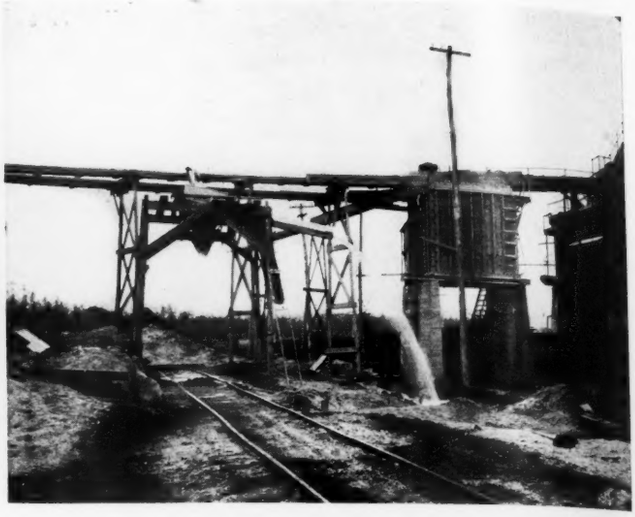
Octagonal plant hopper and conveyor at Dixie plant. This shape is used to permit cars to dump from several directions



The Dixie plant from the hopper showing the conveyor structure made of pipe and angle iron



House over plant conveyor in which men pick roots and trash from material before it is screened



Sand recovery devices at the Dixie plant. A screen in the launder above the bin separates fine from coarse

The sand recovery system used at this plant is ingenious and simple. The sand and water flows down a flume to a take off in which a screen is placed. The water and fine sand passing through this screen runs into a bin 14 ft. square and 10 ft. deep which is hoppered inside. In this hopper the sand settles and is run into cars through a quick-acting gate valve made by cutting of the screw thread from the stem of an ordinary gate valve and fixing it to work with a lever. Such a valve wears out pretty fast but is easy to replace and gives a fairly good method of regulating the flow.

The water and the sand which does not pass through the screen goes to a Stephens-Adamson settling tank with automatic discharge. This is generally used to make concrete sand. By using screens in the flume it is possible to make four different kinds of sand which are sold as concrete sand, mason's sand, filter sand and blast sand. Blast sand is concrete sand with the finest and coarsest particles removed and it is used in the foundry at Petersburg for cleaning castings.

The company makes and repairs the bodies of the hopper-bottomed cars that are used in the field work and in stock-piling,

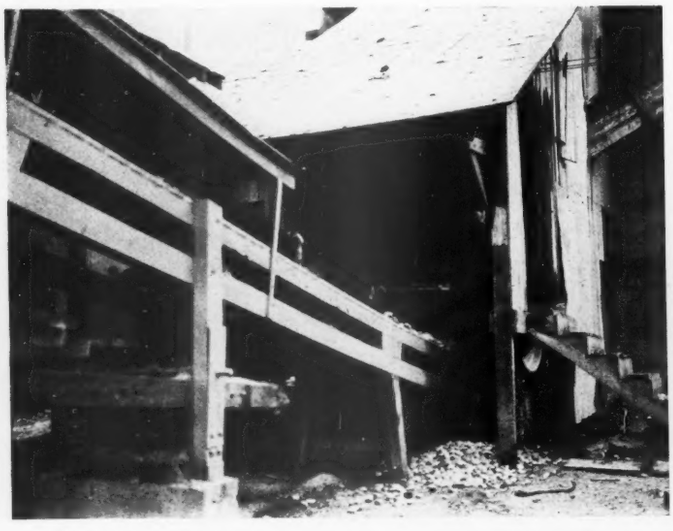
One of the "home made" cars under construction

these bodies being of wood construction.

Stock piling is carried on in the winter, when the building demand is low, and effort is made to keep a sufficient stock on hand to fill any reasonable order promptly. The wisdom of such a course was made apparent last year when an order was received through the South Carolina highway department for 32,000 tons of gravel to be delivered at the rate of 20 cars per day at the very peak of the season, while the plant was being worked to capacity to fill regular orders. The order was filled from the stock pile without interfering in any way with the work of the plant. A 10-ton locomotive crane made by the Orton Crane and Shovel Co. is used to handle the material in and out of the stock pile.

The drive at this plant is all from one 75 hp. General Electric Motor, belts and chains being used to carry the power to the screen drive and conveyor drive on top of the bins.

Water supply is from a pond that has

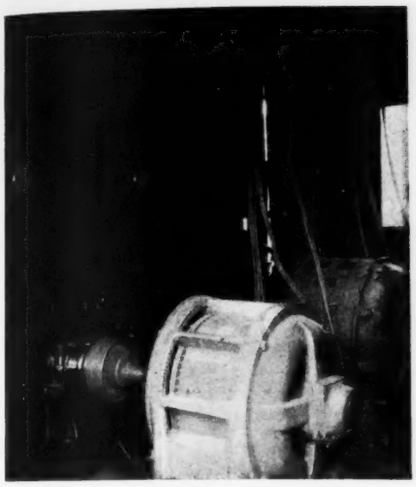


Crusher house and the belt used to return crusher discharge to the main conveyor (Dixie plant)

Petersburg Sand and Gravel Co. plant which is operated by the Dixie company

been made by cutting through to the Appomatox river from a part of the old workings and throwing a dam across to keep the water from the present workings. This pond also serves as a settling pond. The wash water from the plant flows into it and the silt and fine sand are settled out so that the river is not contaminated. Two Gould pumps, each with an 8-in. suction and a 6-in. discharge pump the water and one is driven by a Lincoln electric motor, the other by a Westinghouse motor.

The plant is on the Norfolk and Western railway and is about three miles from Petersburg.



Pumps and motors which supply the wash water

Petersburg Sand and Gravel Co. Plant

The plant of the Petersburg Sand and Gravel Co. is only one mile from Petersburg and is on the Atlantic Coast line railway. It is much older than the Dixie plant for it was built in 1915. Originally it was built as a contractor's plant to supply a few cars daily, but the demand was so strong that a regular business was soon built up.

The deposit does not yield as much gravel as formerly but it supplies a lot of sand which finds a ready market in the western part of the state where sand is scarce. In addition to the current production sand which was stored when the plant was run principally to produce gravel is being reclaimed and added.

The operation is along the same basis as those described in connection with the Dixie plant. A Model 14 Bucyrus dragline digs the material and standard gage equipment takes it to the washing plant. At the hopper there is the same arrangement of grizzly and pan feeder and a 20-in. belt takes the material to the sizing screen. This is of Austin make and is 24 ft. long and of 48-in. diameter. The oversize of the screen is crushed by a No. 9½ Acme jaw crusher. The sand recovery system is like that at the Dixie plant except that the sand hopper is 10x10 ft., instead of 14x14, and two automatic sand settlers are used in the place of one. These are the old-style Link Belt tanks; not the Dull cones at present made by the Link Belt Co. In the place of a locomotive crane, an A-frame machine is used for stock-piling gravel.

As the Dixie plant was built from the experience obtained at the Petersburg plant, the similarity is easily accounted for. But it will be noted that the screen at the Dixie plant is larger, which Mr. Alexander considers an improvement. There are some other features of the plant in which there are differences but the main design of one plant is the same as the other.

Reclaiming Stored Sand

The system of reclaiming stored sand is by the use of a drag scraper of the "Arrowhead" pattern. It is operated by a Lampert steam hoist. The scraper drags the material to an underground hopper from which it is elevated to the sand tanks of the plant, thus adding it to the current production. Preparations were being made, when the plant was visited to reclaim another pile of sand in the same way but in this operation the sand will be washed by a separate stream of water as it enters a hopper above a car. As the sand has already been washed in the plant, not much washing is needed after reclaiming.

The quality of the material produced at both these plants is excellent, and rejections have been few and far between. In order to keep this standard of quality, the greatest care has to be exercised in digging the material. The deposits are fairly free from clay, except the loose sort that washes off easily, but they are bottomed on a hard white clay that is very difficult to handle in the washing plant. According to Mr. Mallory, "one bucket full of clay is enough to spoil three cars of gravel." So the practice is to leave the last of the gravel on the clay bottom to avoid any clay getting into the plant.

J. A. Mallory, Jr., superintendent, Dixie Sand and Gravel Co., Petersburg, Va.

The offices of the Dixie and Petersburg companies are at 214 N. Sycamore St., Petersburg. D. Perkinson is president of both companies and (Mrs.) G. G. Morrison is vice president of both. The office of secretary and treasurer for both companies is held by David Alexander, who is well known in the sand and gravel industry of the country as he is a member of the board of directors of the National Sand and Gravel Association and a regular attendant at the conventions of the association.

Reclaiming from stockpile with A-frame machine at the Petersburg plant

Reclaiming stored sand by dragscraper at the Petersburg plant

Economic Geology of the Limestones of Illinois*

Discussion of Their Characteristics and Uses

By J. E. Lamar
Geologist, Illinois Geological Survey, Urbana, Ill.

THE PRODUCTION OF CRUSHED STONE is one of Illinois' most important mineral industries. In 1925, about 50 quarries in the state were producing and shipping limestone for various purposes including all the important uses of limestone except dimension building stone. The crushed stone sold in Illinois in 1925 amounted to more than 8,500,000 tons valued at more than $7,680,000. Of these totals the amount of agricultural limestone sold constituted 638,490 tons valued at $589,797; flux, 710,310 tons valued at $631,159; railroad ballast, 634,050 tons valued at $439,458; and aggregate for concrete and roads, 5,973,880 tons valued at $5,363,668. In addition to the crushed stone produced, limestone formed the dominant raw material used in the production of 7,101,024 bbl. of cement which at the average selling price of $1.70 per barrel in 1925 was worth more than $12,000,000. Also more than 96,000 tons of lime were burned from limestone and sold for more than $925,000.

The quarrying industry of Illinois groups itself roughly into five principal units. The amount and value of the stone produced in each unit is as follows: Chicago district (including Cook and DuPage counties), 5,807,400 tons valued at $4,943,838; Joliet district (Will county), 655,968 tons valued at $560,834; St. Louis district (including Madison, St. Clair, Randolph and Monroe counties), 913,856 tons valued at $1,122,821; Quincy district (including Adams, Greene, and Jersey counties), 182,033 tons valued at $310,868, and the Southern Illinois district, 149,999 tons valued at $145,247.

Because of the fact that the great central portion of Illinois is underlain by sediments of Pennsylvanian age, consisting principally of sandstone, shale or coal, with relatively minor amounts of limestone, the quarrying industry is concentrated largely in the marginal portions of the state (Fig. 1) where the limestones of older rock systems outcrop. This distribution of sediments is due to the inclination of the rock strata which is such that if it were possible to remove all the overlying material from a certain rock formation throughout the whole state, the surface of this bed would be roughly that of a huge spoon-shaped basin with its longest diameter extending north and south. In eastern and northern Illinois the spoon shape of the Illinois basin is somewhat distorted by a very pronounced fold of the rock strata extending from Lawrence county in southeastern Illinois to La Salle county in northern Illinois and thence north and a little west into Wisconsin. This fold or anticline is known as the La Salle anticline taking its name from the town of La Salle, near which the effects of the folding on the rock strata are most noticeable and easily observed in the Illinois river bluff. The La Salle anticline is responsible for the outcrop near Utica in La Salle county of the oldest limestone known in the state.

*Courtesy of Chief, Illinois State Geological Survey.

The limestones quarried in Illinois are of many different geologic ages. The following table shows the age and sequence of the quarried limestones of Illinois, together with the number of shipping quarries operating in each limestone and the regions in which these quarries are located.

Characteristics and Uses of Illinois Limestones

In discussing their characteristics and uses, the Illinois limestones will be described in the order of their age, beginning with the oldest.

SHAKOPEE DOLOMITE—This rock is quarried at Utica for the manufacture of hydraulic cement and is the only stone quarried at present in Illinois for this purpose. It is the formation which was originally mined between Utica and La Salle for making natural cement in the days before the advent of portland cement. The stone is gray or buff gray in color, generally occurs in relatively thin beds, and is not commonly a shell limestone. It is known as a dolomite as are other rocks of similar composition because it contains a high percentage of magnesium carbonate. The average of four chemical analyses[1] of this dolomite is as follows:

Chemical Analysis

Silica	14.15
Alumina	6.37
Iron oxide	2.35
Calcium oxide	26.32
Calcium carbonate	47.00
Magnesium oxide	12.10
Magnesium carbonate	24.20
Alkalies	0.18*
Sulphur trioxide	1.18
Carbon dioxide	34.70
Water	2.03

*Far too low; true value is probably more than 4% (Eckel).

Physical Analysis (One sample)

French coefficient	1.5
Hardness	17.7
Toughness	7.0
Cementing value	65
Weight per cubic foot	150
Water absorbed in pounds per cubic foot	3.2

[1]Eckel, E. C., Cements, Lime and Plasters, 1905, p. 204.

Geological Systems of Limestone Quarried in Illinois

System	Series	Formation	Location of quarries	No. of quarries
Pennsylvanian		McLeansboro	Fairmont, West Union, Litchfield, La Salle	6
Mississippian (upper	Chester	Okaw	Menard	1
(lower)	Meramec	Ste. Genevieve	Alton, Anna, Shetlerville, Whitehill	4
		St. Louis	Alton, Falling Springs, Stolle	4
		Salem	Columbia	2
	Osage	Burlington	Quincy, Elsah, Eldred	6
Devonian		Wapsipinicon	Moline	1
Silurian		Niagaran	Chicago, Summitt, Lemont, LaGrange, Novak, Lyons, Elmhurst, Bellewood, Thornton, Joliet, Kankakee, Grafton, Port Byron	21
Ordovician		Kimmswick*	Valmeyer	1
		Galena*	Rockford, Belvidere	2
		Platteville	Dixon	1
		Shakopee	Utica	1

*The Kimmswick and Galena are probably of about the same age, but are differentiated because of their dissimilarity as regards their physical and chemical properties. The Galena dolomite is found in northern Illinois; the Kimmswick limestone in southern Illinois.

PLATTEVILLE LIMESTONE—The area in which this limestone outcrops lies principally north of an east-west line through La Salle. It is and has been very extensively quarried locally for aggregate and agstone, but at present only one large quarry is operating in this formation. This quarry is at Dixon in Lee county, where the limestone is being used for the manufacture of cement. In general the limestone is gray, dark gray or blue gray, usually dense, fine-grained, and locally dolomitic. It occurs generally in regular beds of moderate thickness. An average chemical analysis of six samples taken from various parts of the Platteville formation in the vicinity of Dixon and an average physical analysis of 15 samples taken at various points in northern Illinois follow:

Chemical Analysis

Calcium carbonate	82.3
Magnesium carbonate	7.5
Iron oxide and alumina	3.8
Silica	5.1
	98.7

Physical Analysis

French coefficient	8.0
Hardness	14.7
Toughness	8.2
Cementing value	35
Weight per cubic foot	163
Water absorbed in pounds per cubic foot	2.24

GALENA DOLOMITE—The Galena dolomite outcrops in the northern part of the state in about the same area as the Platteville limestone which it overlies. This formation has also been quarried extensively locally for aggregate, road construction, and agstone. There are two principal quarries in this formation, one at Rockford, and the other at Belvidere. The product is used for aggregate, agstone and the like, and some of it is burned for lime. The stone is gray, dense, and fine-grained where unweathered, but after exposure becomes brown and rather porous in the natural outcrop. Below is an average chemical analysis from four samples and a physical analysis from eleven samples.

Chemical Analysis

Calcium carbonate	51.4
Magnesium carbonate	40.1
Iron oxide and alumina	1.7
Silica	6.9
	100.1

Physical Analysis

French coefficient	7.7
Hardness	13.8
Toughness	7.0
Cementing value	37
Weight per cubic foot	166
Water absorbed in pounds per cubic foot	2.41

KIMMSWICK LIMESTONE—The Kimmswick limestone outcrops in but three localities in Illinois, in Calhoun county, Alexander county, and Monroe county. At Valmeyer in Monroe county it has been quarried for a number of years, but increasing thickness of overburden as the quarry face was worked back has forced the adoption of mining. The Kimmswick is a high calcium limestone, and the calcium carbonate content is probably uniformly as high as that of any other limestone in the state. The rock is medium to coarsely crystalline in texture, commonly white or gray and locally pinkish or slightly greenish. The stone is sold principally to aluminum refineries for the manufacture of lime used in the refining process. It is also sold as agstone (agricultural limestone) and for other purposes requiring a limestone high in calcium carbonate. In general the limestone is a little soft for highway purposes. Chemical and physical analyses of Kimmswick limestone follow:

Chemical Analysis

Calcium carbonate	95.70
Magnesium carbonate	3.46
Iron oxide and alumina	0.74
Silica	0.08
	99.98

Physical Analysis

French coefficient	5.6
Hardness	
Toughness	4.0
Cementing value	35
Weight per cubic foot	162
Water absorbed in pounds per cubic foot	1.69

NIAGARAN DOLOMITE—The Niagaran dolomite is the most extensively quarried rock in Illinois. It outcrops principally in the eastern and western thirds of the northern part of the state. It is very extenisvely quarried in the vicinity of Chicago, Joliet, and Kankakee, and also near Port Byron in Whiteside county and at Grafton

LEGEND

Boundary of general subdivisions of the State used in the report.
Boundaries of unit areas for which separate maps are included.
Areas with a supply of local road material exclusive of that of Pennsylvanian age.
Shipping quarries or sites suitable for shipping quarries.

Fig. 1. Index map of Illinois showing subdivisions used in the report

in Jersey county. The stone differs considerably in character in the various areas in which it is quarried. In the Chicago district the dolomite is commonly light gray or white, with abundant fragmentary fossil material. In some places the rock consists of ancient coral reefs. Where the amount of fossil material in the limestone is high the porosity of the stone is commonly somewhat greater than normal.

In the Joliet district, the Niagaran is commonly more cherty than in the Chicago area. The rock is gray to buff and is fine-grained, usually in medium to thin beds. In the Kankakee area the dolomite is most like Chicago stone; in the Grafton region like the Joliet stone though usually less cherty.

The Niagaran dolomite is a very utilitarian stone. It is used for aggregate, ballast, agstone, flux in iron smelting, and for the manufacture of lime. Large quantities have also been used for riprap and rubble, and building purposes. As will be seen from the following analyses the total carbonate content of the dolomite is very high. Phosphorous and sulphur content is generally low.

south to Jersey county and again in Monroe county. It is also exposed in the southern portion of the Ozark ridge in Union, Alexander and Pulaski counties. The rock is commonly white or gray, coarsely crystalline or granular, and contains numerous fossils. It is also commonly cherty, but the chert occurs in zones or beds which make it possible to quarry the non-cherty portions selectively. The limestone is of a high degree of purity and is used principally to make lime, agstone, and whiting. It is also sold as aggregate and the like. In general it is somewhat soft for use in concrete pavements, though certain portions of the formation are acceptable. The principal area in which the Burlington is quarried is between Quincy and Marblehead. In this area there are four quarries. Two of these have taken to mining as the most economical method of overcoming a heavy overburden, and of selective quarrying. Other quarries in the same limestone are located at Eldred and Elsah, in Green and Jersey counties, respectively. An average chemical analysis of seven samples of the Burlington limestone quarried in the Quincy area and an

quarrying it. The Salem limestone is quarried principally in the vicinity of Columbia, Monroe county and is sold for aggregate, agstone, ballast, flux and the like. Average analyses of the Salem are given below:

Chemical Analysis

	Monroe County	Brown County
Average from analyses	3	8
Calcium carbonate	96.98	85.15
Magnesium carbonate	1.04	1.97
Iron oxide and alumina	0.82	2.67
Silica	1.11	9.96
	99.95	99.75

Physical Analysis

Average from analyses	4
French coefficient	9.4
Hardness	13.3
Toughness	7
Cementing value	88
Weight per cubic foot	162
Water absorbed in pounds per cubic foot	2.11

ST. LOUIS LIMESTONE — Outcrops of the St. Louis limestone are found in the Mississippi river bluffs and the area adjoining them at intervals from Pulaski county north to Hancock county. The principal areas where this limestone is quarried are

CHEMICAL AND PHYSICAL ANALYSES OF NIAGARAN DOLOMITE

Chemical Analysis

	Chicago	Joliet	Kankakee	Grafton
Calcium carbonate	53.4	49.3	48.7	49.0
Magnesium carbonate	43.0	39.0	37.9	42.5
Iron oxide and alumina	1.0	4.8	4.8	1.8
Silica	1.4	6.7	6.2	5.4
	98.8	99.8	97.7	98.7
Number of analyses averaged	28	10	6	2

Physical Analysis

	Chicago	Joliet	Kankakee	Grafton
French coefficient	7.96	8.75	7.87	5.9
Hardness	14.0	15.1	13.5	13.9
Toughness	7.2	8.0	6.9	5.4
Cementing value	43	53	39	22
Weight per cubic foot	167	167	165	158
Water absorbed in pounds per cubic foot	1.90	2.37	2.45	3.09
Number of analyses averaged	18	17	32	3

WAPSIPINICON LIMESTONE — The Wapsipinicon limestone underlies a comparatively small area in Illinois, chiefly in the vicinity of Moline and Rock Island. The only quarry in the formation is located at Moline. Operations are now being conducted by mining because of the heavy overburden. The stone is a yeast gray color, fine-grained and very dense. It occurs in beds 1 to 5 ft. thick. The stone more than 3½ in. in size is sold to the sugar refineries and carbide works and the smaller stone is used for aggregate, agstone, and the like. An average of two chemical analyses and a physical analysis of the Wapsipinicon limestone follows:

Chemical Analysis

Calcium carbonate	97.31
Magnesium carbonate	0.59
Iron oxide and alumina	1.77
Silica	1.26
	100.93

Physical Analysis

French coefficient	8
Hardness	14
Toughness	6
Cementing value	34
Weight per cubic foot	165
Water absorbed in pounds per cubic foot	0.99

BURLINGTON LIMESTONE — The Burlington limestone outcrops at intervals in the bluffs along Mississippi river and the region adjoining from Henderson county

average physical analysis of eight samples taken from Adams and adjoining countries are as follows:

Chemical Analysis

Calcium carbonate	96.52
Magnesium carbonate	2.29
Iron oxide and alumina	0.78
Silica	0.28
	99.87

Physical Analysis

French coefficient	6.35
Hardness	12.8
Toughness	6.2
Cementing value	52
Water absorbed in pounds per cubic foot	1.40
Weight per cubic foot	163

SALEM LIMESTONE (SPERGEN) — The Salem limestone outcrops in many places in western Illinois, particularly in Brown, and Schuyler counties. It also outcrops commonly in southern Illinois, particularly in Monroe and Randolph counties. In general the stone is gray or blue gray, in regular beds, and relatively free from chert. In places a portion of the formation as much as 30 ft. thick is composed almost entirely of fossil debris, small fossils and oolite grains. This portion of the Salem formation is similar to the well known Bedford limestone of Indiana with which it is correlated. It seems probable that the Illinois stone could be used for the same purposes as the Bedford should market conditions warrant

the Falling Springs-Stolle area in St. Clair county and at Alton, in Madison county. In the former three quarries are operating in the St. Louis and at the latter place two quarries which are a consolidation of a number of quarries formerly operated individually. The St. Louis is a dense, fine-grained, white to gray limestone commonly occurring in regular beds. It is a high calcium limestone and is therefore suitable for many purposes. It is sold for aggregate, ballast, agstone, rubble and riprap, and is used to make lime at Alton. The average of nine analyses of this limestone is as follows:

Chemical Analysis

Calcium carbonate	96.5
Magnesium carbonate	0.6
Iron oxide and alumina	Trace
Silica	1.6
	98.7

Physical Analysis

French coefficient	9.5
Hardness	15
Toughness	8.6
Cementing value	70
Weight per cubic foot	168
Water absorbed in pounds per cubic foot	0.59

STE. GENEVIEVE LIMESTONE — The Ste. Genevieve limestone outcrops principally in southern and southwestern Illinois. It is quarried at Alton, in Madison county, at Anna in Union county, at White-

hill in Johnson county, and at Shetlerville in Hardin county. One of the outstanding features of the Ste. Genevieve is the oolite which in places makes up the greater portion of the formation. Microscopic examination of the oolite shows that it consists of many spheroidal oolite grains and much rounded calcareous debris, held together by a calcareous cement. The limestone is gray to white, commonly dense, though locally the oolitic portions are somewhat porous, and commonly occurs in relatively thick beds. The stone is sold as aggregate, ballast, agstone, and is ground for whiting. An average of 12 chemical and 10 physical analyses is given below:

Chemical Analysis

Calcium carbonate	92.1
Magnesium carbonate	[illegible]
Iron oxide and alumina	1.8
Silica	3.2
	100.0

Physical Analysis

French coefficient	9.46
Hardness	14.45
Toughness	8.9
Cementing value	65
Water absorbed in pounds per cubic foot	0.96
Weight per cubic foot	168

OKAW LIMESTONE—The Okaw limestone outcrops principally in Monroe and Randolph counties in southern Illinois. It is quarried locally in a number of places in these counties, but the only quarry equipped to crush crushed stone is that of the southern Illinois penitentiary at Menard near Chester in Randolph county. In general the rock is medium to coarse grained, granular and locally contains chert bands. The upper portion of the limestone is locally interbedded with shale, but the lower part is practically free from this material. The stone quarried at Menard is sold principally for agricultural limestone and aggregate. The averages of seven chemical and five physical analyses of Okaw limestone follow:

Chemical Analysis

Calcium carbonate	90.52
Magnesium carbonate	3.23
Iron oxide and alumina	2.15
Silica	4.04
	99.94

Physical Analysis

French coefficient	9.27
Hardness	15.0
Toughness	7.0
Cementing value	180.0
Weight, per cubic foot	164
Water absorbed in pounds per cubic foot	1.45

PENNSYLVANIAN LIMESTONES—There are six quarries operating in Pennsylvanian limestones in Illinois. At the present time it is impossible to determine the age of these limestones more precisely than to state that they are late Pennsylvanian or McLeansboro in age. Because it is not possible at present to correlate these limestones they will be treated separately.

LA SALLE LIMESTONE—The La Salle limestone is the most important Pennsylvanian limestone quarried in Illinois. As the name indicates it outcrops principally in the vicinity of La Salle. It is the source of the limestone used in making cement in the region in which it outcrops. In the La Salle-Oglesby district two quarries and one mine are working this limestone for cement. Because of the composition of the stone it is necessary only to add a small amount of clay to produce the raw mix for making Portland cement. The limestone is 25 to 30 ft. thick, gray or greenish in color, and commonly shows a brecciated structure. The stone is used exclusively for making cement. The average of 16 analyses of this limestone is as follows:

Chemical Analysis

Calcium carbonate	80.4
Magnesium carbonate	3.1
Iron oxide and alumina	5.6
Silica	9.9
	99.0

THE LIMESTONE AT FAIRMOUNT, VERMILION COUNTY—At Fairmount a bed of limestone 16 to 20 ft. thick is being extensively quarried principally for blast furnace flux. The fine stone is sold for making cement and agstone. The rock is fine-grained, blue gray, and occurs in relatively thin beds. A physical analysis of this stone follows:

Physical Analysis

French coefficient	7.9
Hardness	14.
Toughness	8
Cementing value	40
Weight per cubic foot	165
Water absorbed in pounds per cubic foot	1.2

LIMESTONE AT WEST UNION, CLARK COUNTY—At West Union a 5-ft. bed of buff colored, fine-grained, thin-bedded limestone is being quarried, principally for agstone. Aggregate is also produced. An analysis of the stone is as follows:

Chemical Analysis (1 sample)

Calcium carbonate	97.22
Magnesium carbonate	trace
Iron oxide and alumina	1.10
Silica	1.59
	99.91

Physical Analysis (3 samples)

French coefficient	8.4
Hardness	
Toughness	10
Cementing value	
Weight per cubic foot	168
Water absorbed in pounds per cubic foot	1.04

SHOAL CREEK LIMESTONE—The Shoal Creek limestone is quarried near Litchfield in Montgomery county. The limestone is about 10 ft. thick and consists principally of dense light gray limestone in thin and medium beds. The stone is sold principally as aggregate and agstone. An analysis of the stone is as follows:

Chemical Analysis (1 sample)

Calcium carbonate	96.40
Magnesium carbonate	0.76
Iron oxide and alumina	0.71
Silica	1.76
	99.63

Physical Analysis (4 samples)

French coefficient	10.4
Hardness	16.0
Toughness	8.8
Cementing value	53
Weight per cubic foot	168
Water absorbed in pounds per cubic foot	2.2

The foregoing data are discussed more fully in Bulletin 46 of the Illinois Geological Survey on the "Limestone Resources of Illinois" by Frank Krey and J. E. Lamar, which may be obtained by addressing Dr. M. M. Leighton, Chief of the Survey at Urbana, Illinois.

Some Feldspathic Materials of the Pacific Northwest

THE present demand for feldspar in the states of Oregon, Washington and Idaho, according to Hewett Wilson, consulting engineer, Bureau of Mines, Northwest Experiment Station, comes largely from the four manufacturers of architectural terra cotta who use feldspar in their glazes. The demand is only about five carloads per year and is met by the Atlantic coast producers of feldspar. In the last few years good grades of potash feldspar near San Diego and Riverside, Calif., have been mined and ground in commercial quantities for the southern terra cotta and whiteware industries. South Dakota potash feldspar is ground in Murphysboro, Ill., for the Middle West trade. The demand for feldspar in the Pacific Northwest will increase when whiteware companies start operation in the local field. With a population of over 2,000,000 in three states and the raw materials for whiteware at hand, it is possible that this developement will begin in a short time.

With two exceptions all of the feldspar deposits thus far discovered in the Northwest are of the soda variety. Some have been studied in some detail, while from others only small samples have been received and the deposits have not been visited by members of the experiment station laboratory.

The results of the investigations have been compiled and put forth in bulletin No. 2794, U. S. Bureau of Mines. This contains data on the location and geology of the formations, extent of the deposits, workability, and chemical analyses of the various samples from different deposits. The conclusions arrived at by these studies, according to the report, indicate that at the present time the Pacific Northwest will be largely dependent on feldspar of the soda variety if it is to be obtained from a local source. On account of available quantity, ease of mining and transportation, the deposits at Deer Harbor is the most important source of feldspar for a future whiteware industry. For complete information on the deposits, the reader is referred to Serial No. 2794, Reports of Investigations, Bureau of Mines, Department of Commerce.

Extending a Power-Scraper Gravel-Pit Operation by Unusual Method

C. P. Munger Rock Co. Uses a Combination of Portable Power Scraper and Rail Motor-Car Haulage

By Roy George
Boulder, Colo.

FOR a number of years the sand and gravel industry of Phoenix, Ariz., comprised the production of bank run material excavated from the Salt river by Mexicans. In the fall of 1924, the C. P. Munger Rock Co. was organized and entered the field with a small modern washing and screening plant. The builders and contractors of Phoenix and vicinity were quick to recognize the superiority of the clean and graded product which the Munger company produced and as a result the business has increased in good proportion.

The deposit worked is an old river channel, 20 to 30 ft. in depth and running about 50% sand and 50% gravel. A Sauerman No. 314 portable scraper outfit, electric driven with ½-yd. Crescent scraper, was installed and the first operations with this rig were on a 200-yd. radius. The material was dragged to a ground hopper at the plant with a plate feeder on the bottom which discharged on to a grizzly. Later the operating span was increased to entirely work out the ground between the plant and the main deposit and the method of carrying materials to the plant was also changed.

Operation Method

At the present time the ground is worked by moving the scraper rig to a new location and placing it so that it can cover a fan-shaped area 800 ft. long and 400 ft. wide at one set-up. This haul is somewhat longer for an outfit of this size, but it appears to have done satisfactory work. The ground layout makes this longer haul necessary.

The material as excavated is coarse with boulders as large as 8-in. This is discharged into a field trap built in the bank at the rear of the pit. From this pit the material is conveyed by a skip haulage system to the feeder at the plant. The skipway is of standard gage track, 900 ft. long and built on a gradual incline, ending on a tipple built over the feeder. The skip-car is of somewhat unusual design, comprising a 1-ton Ford truck chassis with regular locomotive wheels, and a Brookfield gasoline locomotive attachment. A double transmission system gives the skip equal forward and backward speeds. The skip-body resting on the chassis is of 3-yd. capacity. This car haulage system replaces the old method through which a 1-yd. skip was drawn on narrow gage track by a small electric hoist.

This combination of portable power scraper and car haulage system for excavating and conveying sand and gravel to the crushers and bins is a rather unusual feature

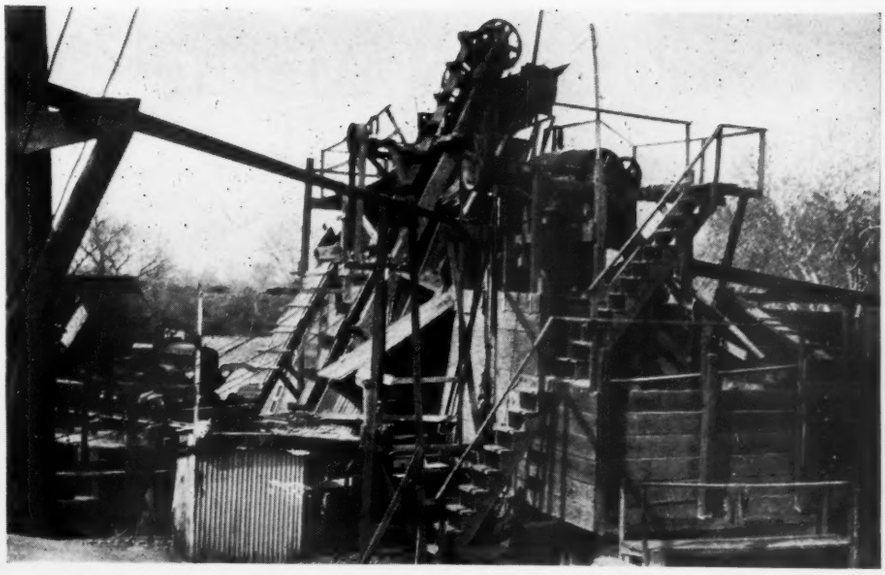
C. P. Munger Rock Co. operation at Phoenix, Ariz. The scraper is shown discharging into the field trap built in the bank. The skipway leads to the plant in the distance

of operation. In this instance it has demonstrated that it is fully as satisfactory as the usual combination of scraper and belt conveyor commonly used for extending a pit after the scraper has cleaned up all the short-haul material around the plant.

At the plate feeder the material is passed over a bar grizzly set at 2½ in. openings. The oversize passes to a jaw crusher for further reduction and the material passing the grizzly to a belt and bucket elevator,

Skip dumping to the grizzly. It is mounted on a motor-truck chassis with car wheels

40 ft. on centers, 20 in. wide, equipped with 9x18-in. buckets. This elevator feeds a 30 in. x 15 ft. rotary screen perforated to produce four sizes: 2½ in., 1½., 1¼ in. and ⅜ in. A surrounding screen takes care of chatts and the ⅜ in. to sand separation



Washing and screening plant, showing the arrangement of feeder, grizzly, elevator and screen

passes to a sand-settling tank for further grading. The material is all thoroughly washed, the water supply being obtained from a well near the plant. A 4-in. centrifugal pump operated by a 5 hp. electric motor forces the water to the top of the plant. Screens are all equipped with sprays for additional washing and a flume takes the wash water and dirt to an old pit about 1500 ft. from the main plant.

Power Costs Low

Power costs are rather low in the Salt river valley, current being obtained from the power generating plant at the Roosevelt and Horse Mesa dams. A total of something less than $1 per hour is said to be the cost to operate the complete system. Only five men are required to run the plant and these are divided as follows: One on the truck on the skipway, one at the trap loading the skip, two at the feeder and crusher and one man for general work.

The washed and graded material is stored in four bunkers, each of 125 cu. yd. capacity. The bunkers have bottom discharge and the floor below is of cement. Deliveries are made entirely by motor truck, a fleet of five being maintained under contract for this purpose. These trucks are fitted out for this type of service and painted and lettered uniformly with the company name. The checking office is conveniently located on the road leading to and from the plant so that incoming trucks can stop for orders and outgoing trucks for tickets with a minimum loss of time. This delivery system also helps to control deliveries and cuts down appreciably delays and mistakes.

Demand for Washed Material

The growth of the city of Phoenix and with it the increased demand for standardized material has kept the plant quite busy filling orders. At peak times, 20 hr. per day of production is not at all unusual. Through its high quality the company has succeeded in securing the confidence of its customers, but at the same time it is a great believer in publicity. One of the forms sent out to customers and prospects from time to time lists the prices effective on certain dates. The following data taken from one of these forms are given below:

WASHED AND SCREENED CRUSHED ROCK, SAND AND GRAVEL

Delivered prices from plant, effective Sept. 1, 1926

	To McDowell from 6 Pts. to 16 St.	McDowell to Thomas Road	Thomas Road to Indian School
2-in. crushed rock and sand, No. 2	$1.75	$1.85	$2.00
1¼ - in. crushed rock and sand, No. 1	2.00	2.10	2.25
Sand—all kinds	1.75	1.85	2.00
Chat for driveways and sidewalks	3.00	3.10	3.25

Minimum truck delivery, $1.00.

C. P. Munger is the president of the company and Herman Douglass, plant superintendent. E. J. Chapman is in charge of the office and delivery system.

End view of the plant showing the storage bunkers

Gradation of Machine-Broken Stone

Part II. Study of the Percentages of Various Sizes Produced in Jaw, Disc and Roll Crushers

By Wm. T. W. Miller
Sheffield, England

IT is natural to look for some differences in the performances of various machines, and certainly the type of crusher, and more especially the manner in which the faces approach each other when applying the crushing force, does not have a bearing on the amount of fines made in the reduction process.

Given free crushing, without choking or packing, machines fitted with faces of like character and having a similar movement will give almost identical results as is evidenced by Diagrams 1 and 2 comparing the gyratory and the jaw crusher. (See the first installment of this series of articles in Rock Products, March 19, p. 56.)

It should be remembered that any appreciable loss of movement or excessive wear changing the formation of the crushing faces will affect the proportions, but this applies equally to any machinery of this type.

The roll-jaw movement in the crusher used for the tests recorded in Diagram 3 gave a rubbing action on the material being crushed, and the extent of the reduction was also greater than in the first two series of tests, both these factors have an influence on the performance curves. (Diagram 3 will be found on page 57, Rock Products, March 19, 1927.)

Comparison of Gradation Tests with Various Machines

Unless some disturbing factor of this nature enters into the problem the gradation curves from widely different machines will agree more nearly than is sometimes considered possible, as is proved by the results of the six tests plotted in two series in Diagrams 4 and 5.

Diagram 4 is a record of three tests made on hard hematite ore. In this case the feed size varied from 2-in. to 1-in. cubes. The Symons disc crusher had plain saucer-shaped discs of 24-in diameter. The granulator, of the jaw type, has a feed opening 5 in. wide and 16 in. long with a roll-jaw movement, the crushing plates having fine pitched teeth. The rolls were 30 in. diameter and 16 in. wide, with the smooth shells.

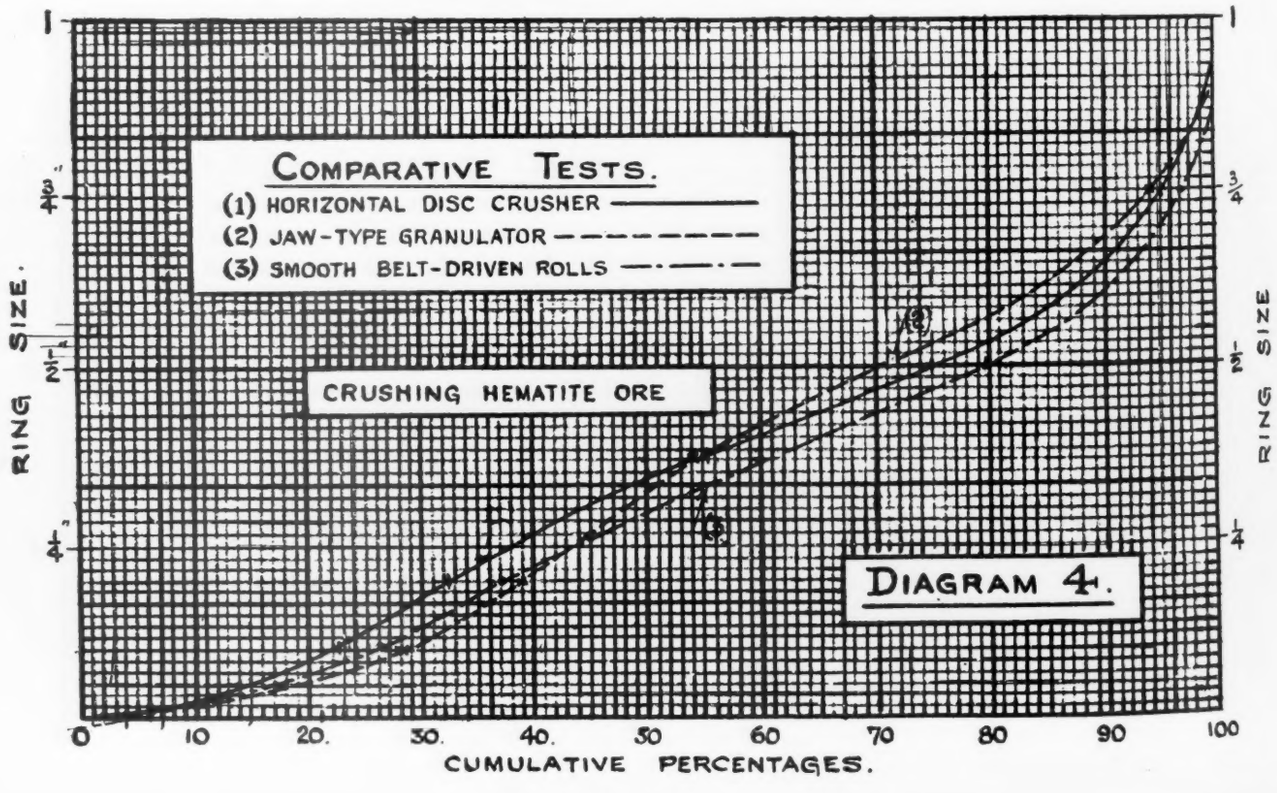
For Diagram 5 the material crushed was a medium hard limestone, the feed size being under 2½-in. ring and over 1¼-in. ring. The machines used were similar to those in the previous series except that the plain rolls were 36 in. diameter.

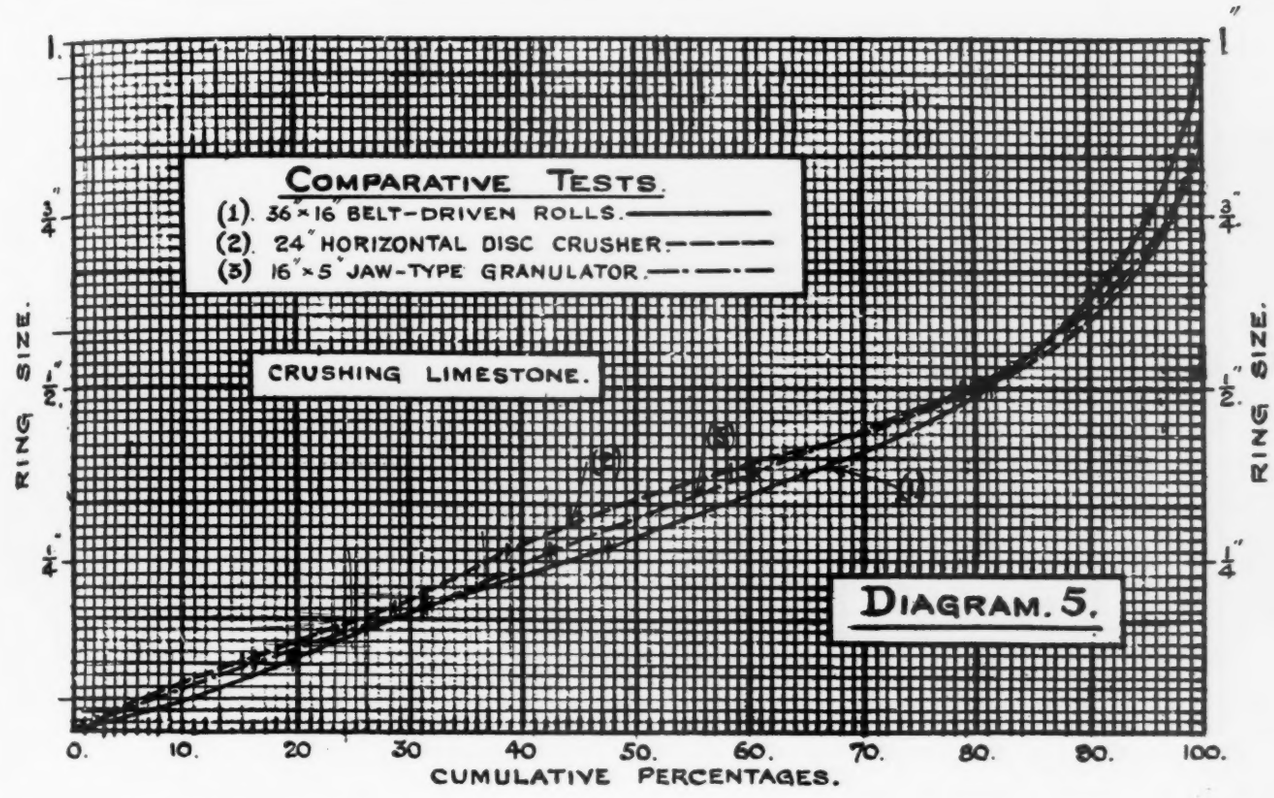
It might be expected that the disc crusher with its rapid clearance of the fines due to the centrifugal action and with its direct crushing nip, would show some advantage over the granulator which has a rubbing movement on the material held between the jaws.

The slippery nature of the hematite ore used for the three tests outlined the Diagram 4 emphasizes this peculiarity in the action of the granulator, although the same tendency is evident in Diagram 5. The corrugated faces in the jaw machine should give cleaner breaking with their beam action than the smooth surfaces of the discs, and on the crystalline material this may neutralize the attrition between the particles in the granulator.

It is probable that the rolls were small in diameter for the feed size and, being somewhat lacking in gripping power, would be liable to make more fines than would have been the case had they been of larger size.

Notwithstanding the great differences in the movements of the three types of crushing





machines the grading of the product does not show the variations that might have been anticipated, the effect of wear on the crushing faces is however notably at variance in the three machines.

Proposed Study of Natural Building Stones

COMMITTEE D-18 ON NATURAL BUILDING STONES, one of the more recently organized standing committees of the American Society for Testing Materials, held at the Bellevue-Stratford hotel, Philadelphia, on March 16, what is considered to be a rather important meeting in further organizing the work of that committee in a way that will permit an actual start being made on the research and test program which the work of this committee will involve.

In the absence of the chairman, F. Y. Joannes, in Europe, the meeting was presided over by the vice-chairman, W. M. Greig, assistant engineer, Delaware River Bridge Joint Commission, Philadelphia.

The membership was broadened by the election of new members embracing a branch of the industry not previously included in the committee, namely, the marble industry, so that now the granite, limestone and marble industries are well represented on this committee. Steps to extend further the representation of the committee were taken.

The committee has adopted the following program of activities:

(*A*) Uniform nomenclature applying to the stone industry;

(*B*) Physical and chemical properties as affecting structural stability and weathering;

(*C*) Effect of external agencies, including working processes, on the appearance and durability of building stone;

(*D*) Prescribed tests and standard methods of testing;

(*E*) Thermal properties and fatigue of stone and the effect of various forms of backing;

(*F*) Effect of various materials and processes used in handling, setting and cleaning on the appearance and weathering of building stone;

(*G*) Development of proper specification requirements: (*a*) Granite; (*b*) Limestone; (*c*) Standstone; (*d*) Marble; (*e*) Other Stones;

(*H*) Names and definitions for stone finishes;

(*I*) Structural integrity of stone after subjection to fire;

(*J*) Preservation and maintenance of old stone structures;

(*K*) Resistance to abrasion under various conditions of usage.

A new sub-committee on Methods of Testing was appointed to study existing test data and the methods of testing stone now in use.

The report of the sub-committee on data, which has been at work since the last meeting, including an appended report on weathering of stone, was received and discussed in detail. Certain of its several recommendations were then acted upon and others tabled for later consideration.

Arrangements were then made for securing funds necessary to finance such further work of compiling a bibliography and a working file of data as was found necessary in planning the actual series of test studies.

The chairman of the committee is F. Y. Joannes, architect, 420 Lexington Avenue, New York City. The secretary is H. S. Brightly, director, Architects Service Bureau, Indiana Limestone Co., Bedford, Ind.

Insulating Bricks Classed Duty Free

IMPORTERS of building materials have won another important test case before the United States Customs Court at New York recently. In an opinion rendered by Judge Young, merchandise described as "moler solid insulating bricks" is held properly entitled to free entry under paragraph 1536 of the Tariff Act of 1922. Protests of Van Oppen & Co., Inc., making this claim, are sustained. The collector's assessment at 30% ad valorem, under paragraph 214, Act of 1922, as a manufactured earthy or mineral substance, is reversed.

Judge Young meets the contention that this brick does not come within the general class of merchandise commonly known as brick with the statement that, while the brick at issue was not designed primarily for building or structural use, its presence in a building or wall has in fact a structural value.

It was brought out at the trial that the landed cost of this brick is about $85 per thousand.

Congress, Judge Young points out in concluding his opinion, did not state that building brick, structural brick or any other kind of brick should be free of duty, but that all brick was duty free unless specially provided for.

Research on the Lime-Silica-Alumina (Portland Cement) System*

Further Investigation of the Compound $8CaO \cdot Al_2O_3 \cdot 2SiO_2$

By W. C. Hansen, W. Dyckerhoff, F. W. Ashton and R. H. Bogue[1] [2]

IT was announced by Janecke[3] in 1912 that he had found a compound $8CaO \cdot Al_2O_3 \cdot 2SiO_2$ in the three-component system of lime-silica-alumina. Rankin and Wright[4] doubted the existence of this compound, basing their arguments on the fact that they had found no indication of it in their extensive studies of this three-component system.[5] Wetzel[6] made a study of sections of the sample obtained by Janecke etching them with acid and came to the conclusion that the compound described by Janecke was but a phase of primary crystallization in the glass and could not have the composition of the sample. The description of this phase by Janecke and Wetzel showed, however, that it differed from all those described by Rankin and Wright.

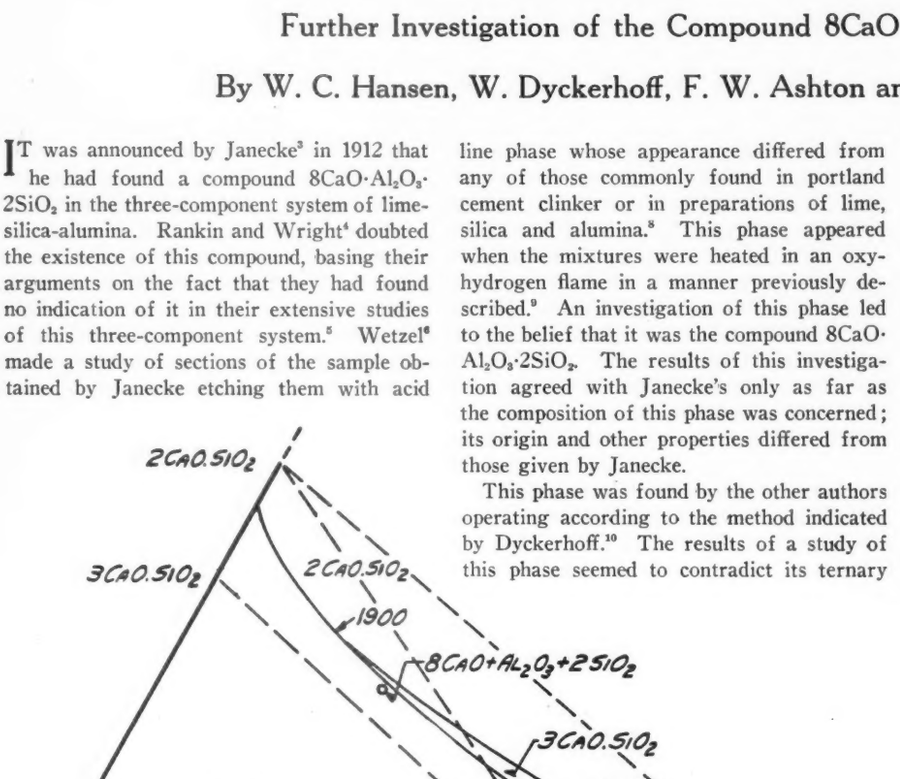


Fig. 2. Part of diagram representing the three-component system $CaO \cdot Al_2O_3 \cdot SiO_2$ (Rankin and Wright)

An extensive investigation of the three-component system in question by one of the co-authors[7] led to the discovery of a crystalline phase whose appearance differed from any of those commonly found in portland cement clinker or in preparations of lime, silica and alumina.[8] This phase appeared when the mixtures were heated in an oxy-hydrogen flame in a manner previously described.[9] An investigation of this phase led to the belief that it was the compound $8CaO \cdot Al_2O_3 \cdot 2SiO_2$. The results of this investigation agreed with Janecke's only as far as the composition of this phase was concerned; its origin and other properties differed from those given by Janecke.

This phase was found by the other authors operating according to the method indicated by Dyckerhoff.[10] The results of a study of this phase seemed to contradict its ternary nature. Advantage was taken of a favorable opportunity to make joint tests, whose results are described here.

Description of Tests

The raw materials used were calcium carbonate, alumina, silica and iron oxide, which had the following chemical analyses:[11]

ANALYSES OF RAW MATERIALS

	Calcium Carbonate	Alumina	Silica	Iron Oxide
CaO	55.55	0.02	0.02	.....
CO_2	43.63	.....	.....	.....
Al_2O_3	0.01	98.35	0.50	.....
SiO_2	0.03	.....	99.37	.....
Fe_2O_3	.....	0.10	0.03	99.15
FeO	.....	.....	.....	nil
MgO	0.07	0.08	.....	.....
SO_3	.....	.....	.....	nil
P_2O_5	0.02	.....	.....	.....
Cl	0.04	0.01	.....	.....
Loss on ignition	43.97	1.55	0.11	0.93

Preparation

The compounds were combined in the desired proportions placed in a platinum evaporating dish and were heated in a muffle. The acid was thus driven off. The mixture was then mixed with water to a stiff paste and was kneaded for half an hour to secure complete homogeneity. The paste was then rolled out on wax paper into rods approximately the size of a pencil. These were dried and subsequently melted in the oxy-hydrogen flame. Drops were formed which fell on a sheet of platinum and were cooled exposed to air. Several grams of the mixture $8CaO \cdot Al_2O_3 \cdot 2SiO_2$ were prepared in this manner for use in the tests described below.

The drops were pulverized and analyzed to make sure that the mixing proportions were not impaired by the heating process. The following table gives the results of these analyses compared to the theoretical proportions of the mixture.[11]

	Analysis of Drops %	Theoretical Composition %
CaO	66.73	66.76
Al_2O_3	15.25	15.23
SiO_2	17.86	18.00

Thin sections were prepared from other drops for a microscopic examination. Fig. 1 reproduces a photo-micrograph of one of these sections through crossed Nichols. The needleshaped crystals, appearing in this picture, predominated in all melts and seemed to indicate the presence of the ternary compounds. The pulverized samples showed also some glass and CaO. Precise optical measurements of these needles could not be made due to the lack of well formed crystals; double refraction and refractive index, however, yielded values in the vicinity of those given by Wright for $3CaO \cdot SiO_2$.

This seemed to indicate that the needles consisted of tricalcium silicate. If this were the case, two other phases should have appeared, when proper handling produced an equilibrium, namely, $2CaO \cdot SiO_2$ and $3CaO \cdot Al_2O_3$.

The diagram established by Rankin and Wright[5] shows (Fig. 2) that $3CaO \cdot SiO_2$, $2CaO \cdot SiO$ and $3CaO \cdot Al_2O_3$ may exist simultaneously in this mixture under conditions of equilibrium up to a temperature of 1455 deg. C. Melting takes places at this temperature. To produce equilibrium of the samples and to obtain well formed crystals, the temperature used was slightly below 1455 deg. C.

---

*Translated from *Zement* (1927), 4, 51-55.

[1]Published with the permission of the Director of the U. S. Bureau of Standards.

[2]Publication of the Portland Cement Fellowship, U. S. Bureau of Standards.

[3]Zeitschr. Anorg. Chemie, No. 73, p. 200, 1912; No. 74, p. 426, 1912; No. 76, p. 357, 1912; No. 36, p. 273, 1912; No. 37, p. 160, 1912; No. 23, p. 271, 1915. Zement, No. 14, p. 272, 1925.

[4]Zeitschr. Anorg. Chemie, No. 75, p. 63, 1912.

[5]Amer. Jour. of Science, No. 39, p. 1, 1915.

[6]Proc. of the Assn. of German Portland Cement Manufacturers, No. 35, p. 217, 1912; No. 36, p. 347, 1913; No. 37, p. 145, 1914.

[7]W. Dyckerhoff, Dissertation at the University of Frankfurt, 1925. Zement, No. 13, p. 681, 1924; No. 14, p. 3, 1925; also pp. 21, 60, 103, 120, 140, 175, 200.

[8]Crystals of this nature occur in commercial cement.

[9]W. Dyckerhoff, Zement, No. 13, p. 455-467, 1924..

[10]Not published.

[11]Analyses by H. C. Stecker.

Identical handling had to lead to homogeneous substances, providing this compound actually had a ternary structure. The following experiments served the purpose of producing an equilibrium of the phases present.

1. Two drops were wrapped in sheet platinum and were heated one hour in a resistance furnace[12] up to 1600 deg. C. The temperature was then permitted to decrease during one and one-half hours down to 1450 deg. C. It was then held between 1400 and 1450 deg. C. for another hour and a half. The two drops coalesced. An investigation of a thin section as well as of a pulverized sample showed no apparent change produced by this method of handling.

2. Another sample of these drops was pulverized and heated similarly to 1600 deg. C. during one hour. It was then cooled to 1450 deg. C. during another hour. The temperature was then kept between 1400 and 1450 deg. C. for 15 hours. After this procedure the quantity of needle-shaped crystals became reduced, as is evident on the photomicrograph of a thin section shown in Fig. 3. The large crystals frequently show considerably higher double refraction at the edges compared to the interior, as shown on the illustration. This seemed to indicate that the melts formed during the heating process reacted with the crystals. This reaction was, however, incomplete and had not reached the stage of equilibrium.

3. A further sample of pulverized drops was heated to 1600 deg. C. during three hours, was cooled to 1450 deg. C. during one hour and was held at this temperature for 30 hours. Fig. 4 shows a thin section of this sample. The equilibrium seemed practically reached, the needle-shaped crystals had almost disappeared and the melt consisted of a relatively homogeneous mixture of three kinds of crystals, whose optical properties corresponded to those of tricalcium-silicate, dicalcium-silicate and tricalcium-aluminate. Precise measurements made on the pulverized samples confirmed the evidence of the thin sections. Instead of a ternary compound, conditions of equilibrium produced a mixture of three compounds, $3CaO \cdot SiO_2$, $2CaO \cdot SiO_2$ and $3CaO \cdot Al_2O_3$.

There was still the possibility that the ternary compound existed only at high temperatures in stable equilibrium and was divided in cooling to form the three compounds mentioned above. It was, therefore, attempted to establish the presence of such a phase by means of X-rays.

[12]Compare Hansen and Bogue, Journ. Amer. Chem. Soc., No. 48, p. 1261, 1926; description of this furnace and method of measuring temperature.

Tests with X-rays

Homogeneous samples[13] of the pure compounds $3CaO \cdot SiO_2$, $3CaO \cdot Al_2O_3$ and $\beta 2CaO \cdot SiO_2$ were prepared by repeated burning and pulverizing of appropriate mixtures. One-half per cent boric acid was used in preparing $\beta 2CaO \cdot SiO_2$ to prevent decomposition during its alteration to the γ variety.

[13]The X-ray investigations described here were made by E. A. Harrington according to the powder method, as described independently by A. W. Hull (Phys. Rev., No. 10, p. 661, 1917) and by Debye and Scherrer (Phys. Zeitschr. No. 17, p. 277, 1916).

Fig. 1. Micro-photograph of thin section prepared from welted drops. The composition $8CaO \cdot Al_2O_3 \cdot 2SiO_2$ is under observation. Note the characteristic needle-shaped structrue. (Crossed Nichols. Magnified 126 diameters)

A mechanical mixture of these three compounds combined in equimolecular quantities yields a product of the following chemical composition: $8CaO \cdot Al_2O_3 \cdot 2SiO_2$. This mixture was prepared and an X-ray spectrum was made. The same film reproduced the spectrum of a pulverized sample prepared from the melted drops mentioned above. The spectrum of the latter showed several lines which did not exist in the spectrum of the mechanical mixture. These lines could be found again in the X-ray spectrum of CaO.[14]

Table I gives the distances and the relative intensity of the lines appearing on the three spectra. The last column gives the compounds producing these lines.

It was thus established that all lines of the spectrum of the melted samples corre-

[14]Prepared from CaC_2O_4.

Fig. 3. Photomicrograph of Sample 2 after being heated at 1400-1450 deg. C. for 15 hours. The edges of the larger crystals show higher double refraction and the beginning of the formation of $2CaO \cdot SiO_2$. (Crossed Nichols. Magnified 147 diameters)

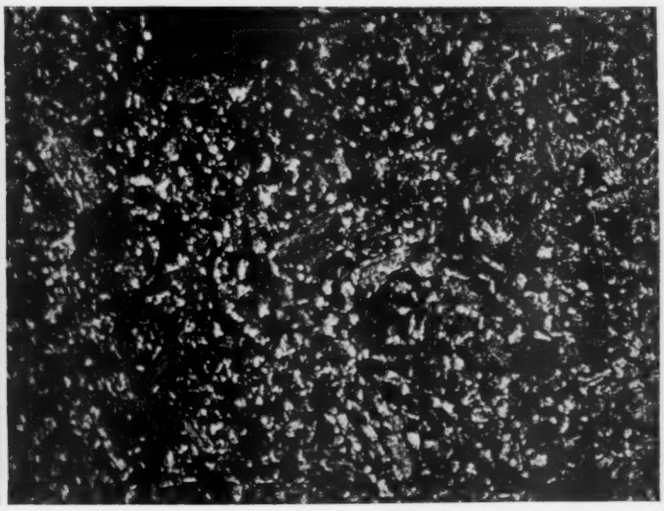


Fig. 4. Photomicrograph of a thin section of Sample 3 after being heated at 1400-1450 deg. C. for 30 hours. The structure is fine grained with only occasional large crystals — the needle-shaped crystals have almost disappeared. (Crossed Nichols. Magnified 147 diameters)

Fig. 5. Photomicrograph of a composition melt of $8CaO \cdot Fe_2O_3 \cdot 2SiO_2$. The same needle-shaped crystals as in Fig. 1 appear. (Parallel Nichols. Magnified 93 diameters)

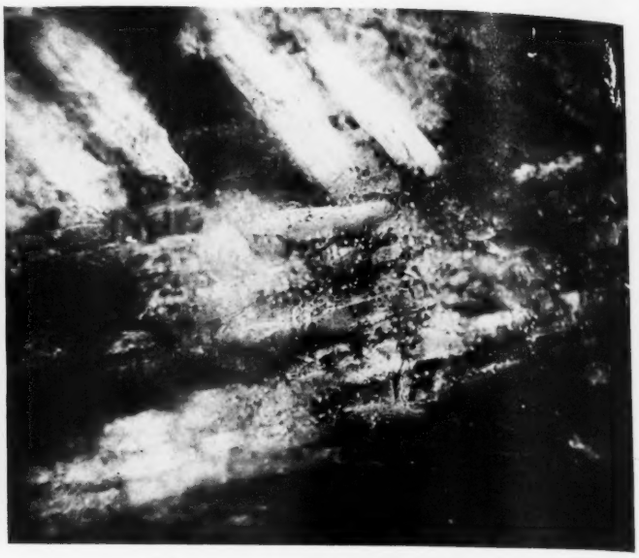


Fig. 6. Photomicrograph of a thin section of the melted drop showing minute inclusions. (Crossed Nichols. Magnified 1350 diameters)

sponded to the special lines of the four compounds investigated and that no displacement of the lines nor change of intensity was produced. This proves that neither a new compound is formed nor mixed crystals are present. The needle-shaped crystals, therefore, belong to one of the four compounds and their properties show that they are composed of tricalcium-silicate.

The unusual form of the crystals, in which tricalcium-silicate appears in these drops, seems to depend on conditions of its origin. To find out whether this crystalline form is found in other systems as well, a mixture of the composition $8CaO \cdot Fe_2O_3 \cdot 2SiO_2$ was similarly melted to form drops. Fig. 5 shows a photo-micrograph of this sample. It is evident that needle-shaped crystals are present here, too. The refractive index and the extent of double refraction again yield values corresponding to those found for tricalcium-silicate. This test also shows that the formation of needle-shaped crystals cannot be attributed either to the appearance of a ternary compound or to mixed crystallization of lime, alumina and silica.

Discussion

This investigation has for its object a crystalline phase which differs from all those found by Rankin and Wright. It appears when a mixture of the composition $8CaO \cdot Al_2O_3 \cdot 2SiO_2$ is heated to very high temperature. Different conditions led Dyckerhoff to the conclusion that he was here dealing with a ternary compound $8CaO \cdot Al_2O_3 \cdot 2SiO_2$. These conditions were:

1. The large quantity of these crystals; some sections seemed to show only this one kind of crystals.

2. The appearance of the crystals which differed from that expected under conditions of equilibrium.

3. The absence of the compounds expected under conditions of equilibrium. After heating for several days at 1200 deg. C. the compounds indicated as present by Rankin and Wright failed to appear.

The recent experiments reported here succeeded in dissolving these aggregates; this led to the formation of the three compounds: $3CaO \cdot SiO_2$, $2CaO \cdot SiO_2$ and $3CaO \cdot Al_2O_3$. This was made possible by the use of a new electric furnace, which permitted keeping the temperature over 1400 deg. C. for longer periods than possible in former tests.[1] It was demonstrated that the temperatures used before were not sufficiently high.

The X-ray technique developed in the meantime has also greatly facilitated the checking of results previously obtained.

TABLE I. DATA OF THE X-RAY INVESTIGATIONS OF $8CaO \cdot Al_2O_3 \cdot SiO_2$, OF $3CaO \cdot Al_2O_3$; $3CaO \cdot SiO_2$ AND $2CaO \cdot SiO_2$ AND CaO

Ref. No.	Melted drops of the composition: $8CaO \cdot Al_2O_3 \cdot 2SiO_2$ Intervals	Relative Intensity	Mixture of $3CaO \cdot SiO_2$, $2CaO \cdot SiO_2$, $3CaO \cdot Al_2O_3$ Intervals	Relative Intensity	Calcium Oxide Intervals	Relative Intensity	Compounds producing the lines in the spectrum of the melted drops
1	3.03	4	3.03	4	.....	....	$3CaO \cdot SiO_2$
2	2.77	10	2.77	10	2.77	7	$CaO \cdot 2CaO \cdot SiO_2$ $3CaO \cdot SiO_2$
3	2.69	10	2.69	10	.....	....	$3CaO \cdot Al_2O_3$
4	2.60	4	2.60	4	.....	....	$3CaO \cdot SiO_2$
5	2.39	5	.....	....	2.40	10	CaO
6	2.27	0.5	2.26	0.5	.....	....	$2CaO \cdot SiO_2$
7	2.18	7	2.18	8	.....	....	$2CaO \cdot SiO_2$, $3CaO \cdot SiO_2$ $3CaO \cdot Al_2O_3$
8	2.03	1	2.04	1	.....	....	$2CaO \cdot SiO_2$, $3CaO \cdot Al_2O_3$
9	1.975	2	1.970	2	.....	....	$3CaO \cdot SiO_2$, $3CaO \cdot Al_2O_3$
10	1.895	7	1.895	7	.....	....	$3CaO \cdot Al_2O_3$
11	1.755	4	1.758	5	.....	....	$3CaO \cdot SiO_2$
12	1.695	4	.....	....	1.700	10	CaO
13	1.627	5	1.630	3	.....	....	$2CaO \cdot SiO_2$, $3CaO \cdot SiO_2$
14	1.550	8	1.552	8	.....	....	$3CaO \cdot Al_2O_3$
15	1.483	4	1.485	3	.....	....	$3CaO \cdot SiO_2$
16	1.450	2	.....	....	1.450	8	CaO
17	1.385	1	.....	....	1.388	8	CaO
18	1.345	3	1.342	2	.....	....	$3CaO \cdot Al_2O_3$
19	1.200	4	1.202	4	1.201	6	$CaO \cdot 3CaO \cdot Al_2O_3$
20	1.095	2	1.093	1	1.101	6	$CaO \cdot 3CaO \cdot SiO_2$
21	1.076	0.5	.....	....	1.074	8	CaO
22	1.020	2	1.017	2	.....	....	$3CaO \cdot Al_2O_3$
23	0.980	0.5	.....	....	0.979	7	CaO
24	0.900	1	0.896	1			$3CaO \cdot Al_2O_3$

Summary

Tests were made of melts of the composition: $8CaO \cdot Al_2O_3 \cdot 2SiO_2$ in order to establish whether a compound of this description was existent.

A crystalline phase was obtained by melting the sample in the oxy-hydrogen flame, whose appearance differed from all those ordinarily encountered in mixtures of lime, silica and alumina.

By means of more satisfactory devices an equilibrium was established by producing adequate heating conditions, which conformed to the data given by Rankin and Wright.

Double refraction, refractive index and X-ray spectrum were the same as obtained for pure samples of tricalcium-silicate.

A similar phase appeared in a mixture of $8CaO \cdot Fe_2O_3 \cdot 2SiO_2$ under similar conditions.

X-ray photographs and observations made with strongest magnification showed that the samples were not homogeneous, but that

different crystalline materials were present. All of these observations contradict the assumption that a ternary compound of the composition $8CaO \cdot Al_2O_3 \cdot 2SiO_2$ is present in this system in stable equilibrium, or that a mixed crystallization appears in this part of the three-component system between lime-silicates and aluminates.

The conclusions drawn from these tests indicate that the needle-shaped crystals, which were designated in previous publications as a ternary compound, consist of tricalcium silicate.

Methods of Lime Analysis

THE Research Department, National Lime Association, has prepared a manual of "Methods of Analysis of Limestone, Quicklime, and Hydrated Lime," divided into three sections as follows: I, Methods of Sampling and Care of Samples; II, Methods for Routine Analysis, and, III, Methods for Particularly Refined and Detailed Analysis. This is intended primarily to be a convenient laboratory manual for use in the laboratories of the association and of those manufacturers and consumers who have occasion to keep themselves informed of the chemical composition of their product or raw material.

Section I is a brief résumé of the principles to be considered in sampling lump and pulverized materials, with a note on the particular problems presented in the sampling of lime. Section II contains the methods of laboratory procedure for the determination of those materials about which knowledge is more usually desired, such as insoluble matter, iron and aluminum, calcium, magnesium, sulphate, and carbon dioxide. It also contains methods for "available lime," and for the determination of water. This latter, and that for carbon dioxide, describe forms of apparatus developed in the association laboratory which have been found to be particularly convenient.

Sections I and II are now available for distribution and may be obtained upon request to the National Lime Association, 927 15th Street, Northwest, Washington, D. C.

Section III, which covers methods for more detailed analyses, involving the separation of the oxides of the iron group, the determination of alkalies, manganese, and elements less frequently determined, is in course of preparation.

Output of Masonry, Natural, and Puzzolan Cements Increased in 1926

STATISTICS of hydraulic cements, other than portland cement, in 1926, which include masonry, natural, and puzzolan cements, as compiled by the United States Bureau of Mines, Department of Commerce, show that the production—2,104,891 bbl.—exceeded that of 1925 by nearly 22%. Shipments of these cements from mills in 1926 increased 16% in quantity and about 11% in gross value. Stocks at the mills also increased and were about 68% higher at the end of 1926 than at the end of 1925.

These statistics represent the output of 11 plants in 1926, which are located as follows: One each in Alabama, Illinois, Indiana, Kansas, Kentucky, Ohio, and Pennsylvania; and two each in Minnesota and New York. One new plant, in New York, began production of natural cement in 1926.

The output has been expressed in terms of 376-lb. bbl. to correspond with the statistics of portland cement.

MASONRY, NATURAL, AND PUZZOLAN CEMENTS PRODUCED, SHIPPED, AND IN STOCK IN THE UNITED STATES, 1925 AND 1926

Year	Active plants	Production Barrels	Shipments Barrels	Shipments Value	Stock (Dec. 31) Barrels
1925	10	1,729,343	1,751,725	$2,551,583	107,459
1926	11	2,104,891	2,031,851	2,820,110	180,499

Constant Temperature-Humidity Box for the Storage of Cement Test Specimens

THE surrounding temperature and humidity during the first 24 hours after making affect the properties of cement and mortar test specimens. For this reason, and to conform to the American Society for Testing Materials' temperature requirements of 70 deg. ± 5 deg. F., a constant temperature and humidity storage box has been developed and put into successful operation at the bureau. Because of the high humidity required, as near to the saturation point as possible to attain, the design of a reliable type of apparatus is exceedingly difficult. A large size refrigerator, 40 cu. ft. capacity, was selected for the box proper. Cooling is obtained by a two-cylinder compressor driven by a ¼-hp. motor, with SO_2 as the refrigerating medium. The expansion coils are in the box. Heat is supplied by a nichrome resistance coil in the box. A ¼-hp motor driving a one-stage centrifugal pump circulates the water. The bottom of the box forms a reservoir, the water being pumped and distributed around the top of the box by ⅛-in. pipe with small drilled holes. This system is arranged to have the water flow down the sides and two inner partitions. The inside of the box is covered with burlap to distribute and retard the water flow. The original louvers used as partitions were replaced by 6-mesh galvanized-wire screens. These form a very good path for the circulating water. A 1/70-hp. motor drives a blower to circulate the air in the box.

The wet and dry bulb recording thermometers have a slight temperature error because the thermometer proper is of necessity mounted on the outside of the box. A mercury regulator in connection with a control device completes the list of auxiliary apparatus. To eliminate sparking and fouling of the mercury, the device developed by D. J. and J. J. Beaver and described in the article "A new method for the control of thermostats," *Journal of Industrial and Engineering Chemistry*," Vol. 15, p. 359 (April, 1923), was modified and applied. Incandescent lamps operating much below their normal voltage are used for resistance, and the relay of the Beaver apparatus is used to operate a second alternating-current relay which throws the heater or refrigerator into operation. To simplify the control apparatus, the heating and cooling effect were so arranged that either one or the other operates. It is theoretically more efficient to have a neutral zone with a small range with neither heating nor cooling effect, but this would require a control apparatus many times more complicated, with the resulting greater liability to breakdown more than counterbalancing the advantages.—*Technical News Bulletin*, of the U. S. Bureau of Standards.

New Developments in the Phosphate Fertilizer Industry

POTASSIUM chloride is practically the only high grade potash salt produced in any quantity in the United States. Potash in the sulphate form is in many places accepted to be superior to the chloride as fertilizer for certain crops and is also required in other industries. With this view, E. J. Fox and G. W. Whittaker have recently outlined methods by which the chloride may be converted to the sulphate and the resulting by-product hydrochloric acid used in the extraction of phosphate rock. The procedure as described in *Industrial and Chemical Engineering* offers interesting possibilities. In addition to producing a material (potassium sulfate) which has a higher market value than the potassium chloride, the di-calcium phosphate as prepared from hydrochloric acid contains about 40% P_2O_5 instead of 16% which is the maximum produced in the present practice by treating rock phosphate direct with sulfuric acid. Also there is no revision of the phosphate to unavailable form and since the material is not hygroscopic, it can be stored for long periods without fear of deterioration. The remaining by-product after the treatment is calcium chloride.

If future developments along these lines lead to the application of this process in the phosphate fertilizer industry, a good market for ground limestone and lime will result for these two materials are used in the process to precipitate the di-calcium phosphate from the hydrochloric acid solution of phosphate rock.

Loud Speakers of Concrete

RADIO loud speakers of concrete are the coming thing, in the opinion of Henry P. Silva of New Bedford, Mass. After studying echoes in Boston and New York subways and in concrete buildings, he made a concrete speaker for himself. He claims it eliminates distortion.

New Dust-Collecting Installation at the Ford Motor Co. Cement Plant

Coal Mill, Packing Plant, Conveying and Grinding Departments All Have a Most Complete System

IN ROCK PRODUCTS, August 9, 1924, was published a very complete description of the portland cement mill of Ford Motor Co. at Fordson, near Detroit. The plant had then just been completed and put into operation with a daily capacity of 1000 bbl. Since then it has been more visited than probably any other cement mill in the United States.

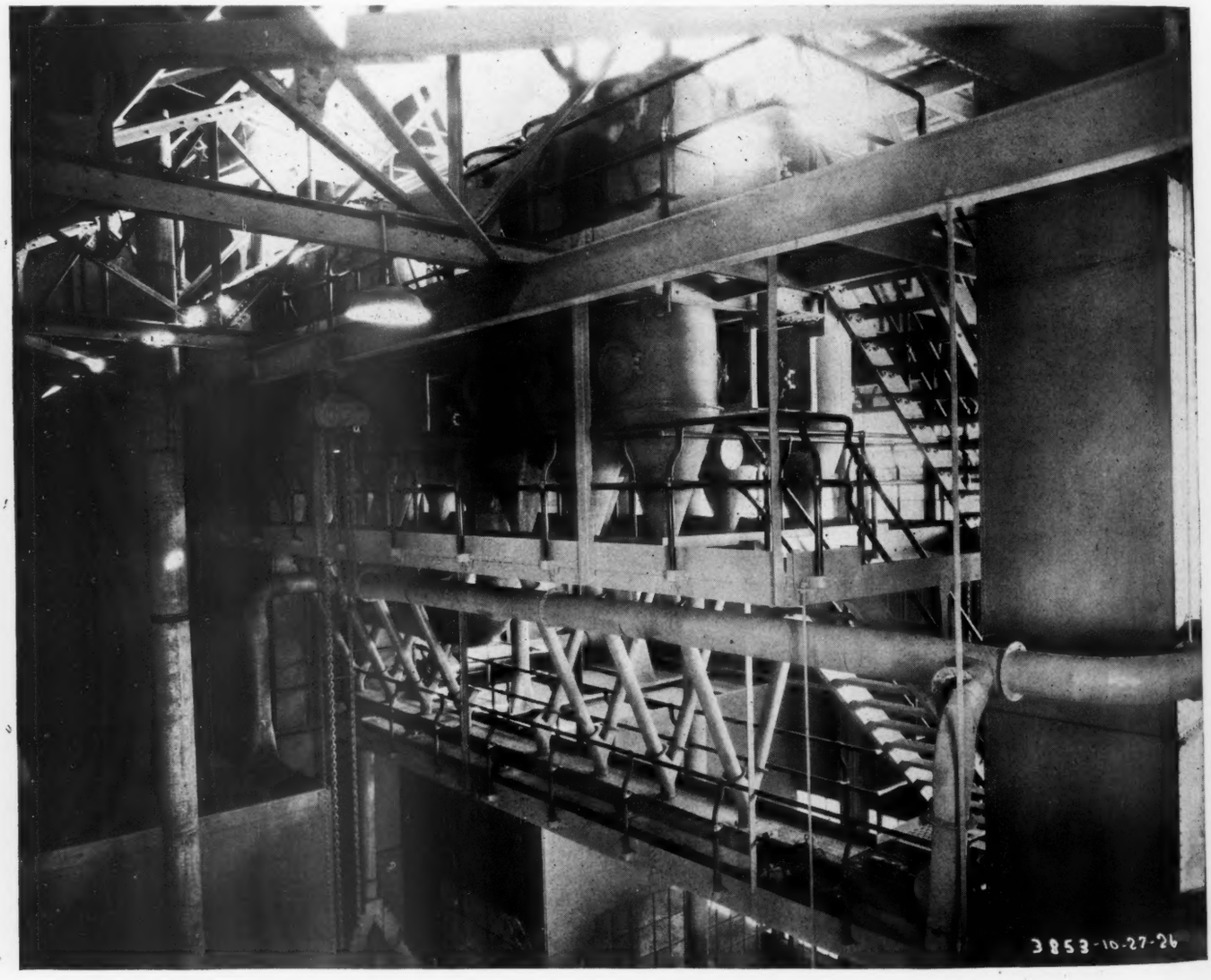
We mentioned in our closing paragraph of the article mentioned that the plant had but one kiln with a capacity of about 1000 bbl. per day, but that all buildings had been arranged so that a second kiln with all necessary grinding machines, storage facilities, etc., could be installed without in any way interfering with the operation of the plant, and at the least possible cost. This foresight, of course, is more than a habit with the Ford Motor Co., which has been so eminently successful in many other lines besides automobile manufacturing.

We have again been given the privilege of visiting this plant and making notes and sketches, and have been generously furnished with photographs of recent improvements and additions.

In our previous article we showed the general layout of the plant and a number of interior views, so we are not here concerned with that part of the plant.

Two Unique Developments

There are two recent, distinct developments and improvements introduced in the Ford plant, which cannot be found in operation in any other plant in the world, and these are: First—The introduction of vacuum filters built by the United States Filter Corp. of Hazleton, Penn., one filter having been installed on the top of each kiln dust chamber. These were described in an article in ROCK PRODUCTS, December 25, 1926,

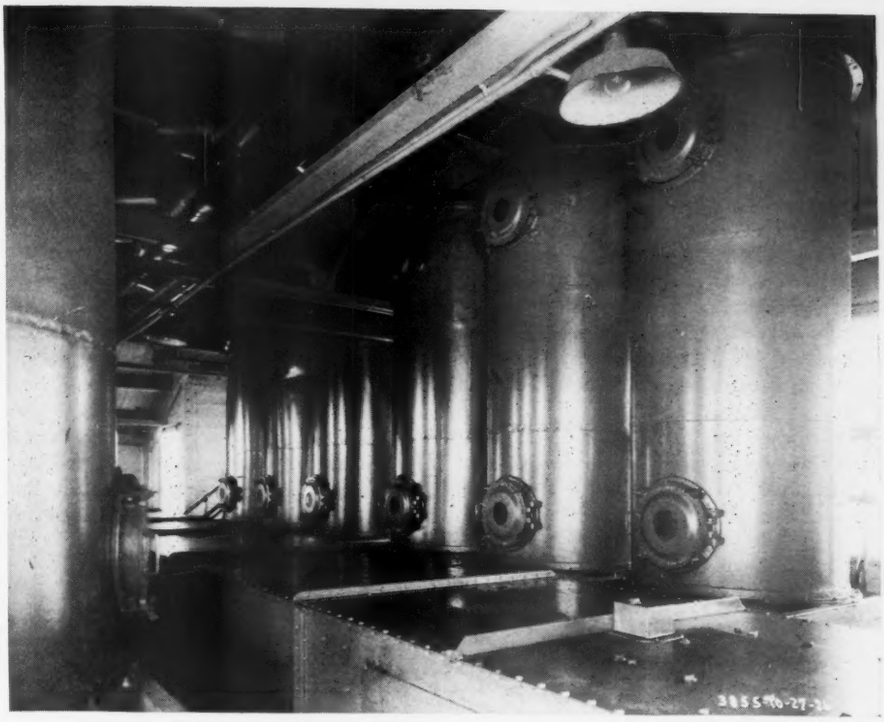


Dust-collecting system on the finish grinding mills and conveyors at the Ford cement plant, Fordson, Mich.

by D. C. Coulson, who gave a very complete account of these filters and their performances; the influence of the extraction of water from the slurry before the slurry enters the kilns; the influence on output; the difference in temperature of gases entering the waste-heat boilers, etc., which all summed up amounted to this: The water content in the slurry is reduced from about 34% to about 17%, the coal consumption from about 106 lb. to about 93 lb. per barrel of cement, and the higher power production from the waste-heat boilers on account of the rise in the initial temperature of the flue gases at boilers, which with 34% of moisture in slurry used to be 850 deg. F. and is now 1250 deg. F. All of these results speak for themselves to the experienced cement operator and engineer and we believe the above results justify repetition in this article.

The second outstanding feature which strongly impresses every visitor to this plant, already emphasized in our article in 1924, is the spotless cleanliness found throughout the plant. The complete safeguarding and wonderful upkeep of equipment as well as painting of each machine are emphasized by the complete absence of dust in connection with every operation in the plant, where dust is present to some extent in practically all other plants.

The explanation of this dustless condition is the very complete dust-collecting system, which has been laid out and engineered with extreme care and foresight; and which, we believe, is one of the finest that can be found in any plant in the world. This installation has been designed and installed by the Dust Recovering and Conveying Co. of Cleveland, Ohio, which is the manufacturer of the "Dracco" system, a combination of the mechanical equipment with expert engineering and supervising in connection with its installation.

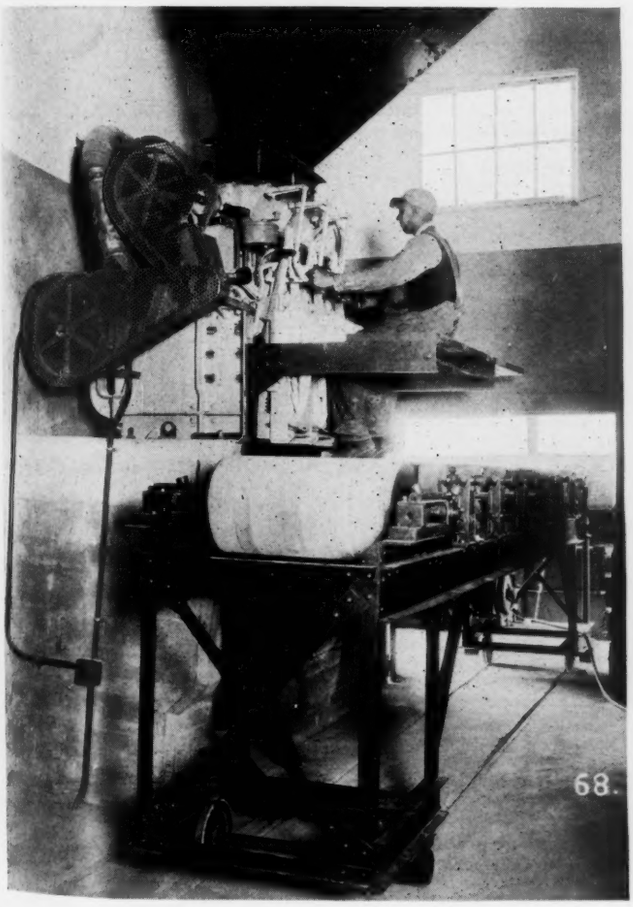


Dust collector installation on the top of the pulverized coal storage tanks

This dust-collecting system in the Ford plant can be divided into three parts:

Waste-Heat Coal Dryers

(1) The coal-dust collecting system solves the problem of collecting all floating coal dust, and at the same time is made a



Packing machine mounting with dust-collector

Dust-collector installation on the sack-cleaning machine

commercial proposition on account of the unique method of drying coal, which is done in the following manner: In the coal mill are two vertical coal dryers designed and built by the Ford Motor Co. Hot air is pulled through these dryers from a couple of hoods placed over the hottest part of the rotary kilns, and the radiated heat from the kilns, which always has been entirely wasted and contributed to making the kiln room uncomfortable, is conveyed to the coal dryers and used for the drying of all coal required in this plant. The dust which is pulled off from the dryers by the large air volume is collected and automatically discharged into the pulverized-coal storage bins. One of the accompanying views shows the top of the coal storage tanks.

So far as we know this is the first use of radiated heat from the kilns for this purpose.

Packing Plant Dust-Collection

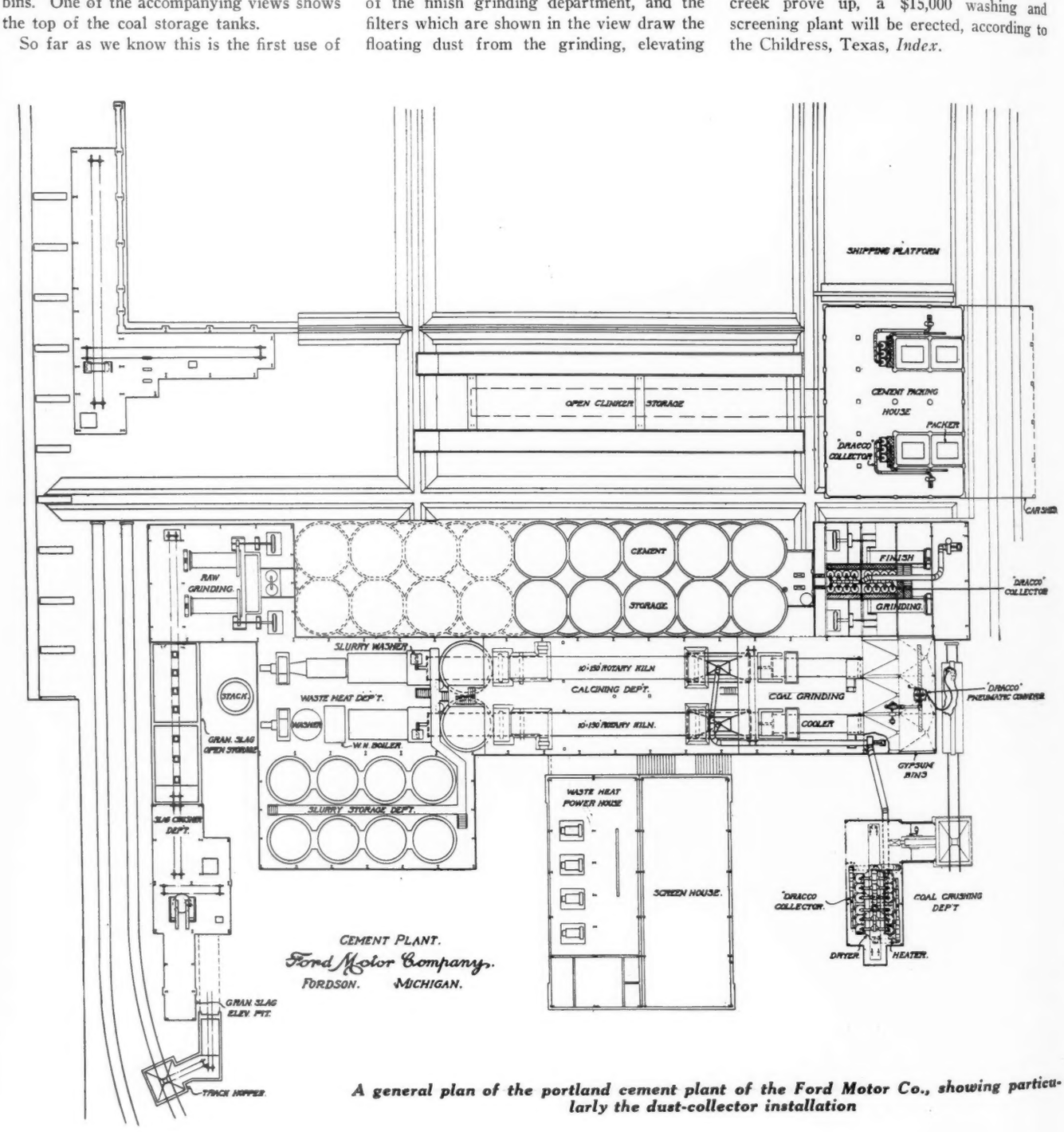
The second installation is the collecting of dust from the entire packing and sack-cleaning operations. One of the views shows a three-compartment Dracco filter, which takes care of the sack cleaning, as well as of the Bates valve-bag packing-machine operation. There are two independent units, each consisting of two 3-spout Bates packing machines, with sack-cleaning equipment.

The third dust-collecting unit in the plant is also the largest one and is shown in one of the views. This installation takes care of the finish grinding department, and the filters which are shown in the view draw the floating dust from the grinding, elevating and conveying operations, collect and automatically return this dust to the conveying system, and make this department spotless.

A general plan of the entire plant is included to show the relation of the various units, and it will here be noted how the new equipment is distributed in the plant.

Childress Gravel Plant Planned

RECENT investigations of sand and gravel deposits in the southern section of Childress, Texas, are reported to have been undertaken with a view to the early establishment of a modern sand and gravel plant. Should the tests made at Ourtaque creek prove up, a $15,000 washing and screening plant will be erected, according to the Childress, Texas, *Index*.



A general plan of the portland cement plant of the Ford Motor Co., showing particularly the dust-collector installation

Financing Agricultural Limestone for the Farmers of Missouri

By E. Dale Smart

Secretary of the Macon County Farmers' Association, Macon, Mo.

MACON COUNTY is the second largest county in the state of Missouri, Texas county being larger in area only. Macon county has the largest population of any rural county. It is located almost in the center of northeast Missouri. It is traversed north and south by U. S. Highway No. 63, which is paved with concrete; east and west by U. S. Highway No. 36, which is being surfaced this year.

The soil of Macon county is of a peculiar texture, being composed of several varieties, such as Selby loam, Putman loam, silt loam and clay loam; this soil is underlaid by a hard, tough layer of soil, but not hardpan.

This peculiar formation is especially adaptable to the growing of leguminous crops, if the soil is sweetened, as one of the peculiarities is, that the county over, the soil is generally sour; hence the great need of liming.

This soil, if properly handled and a course of diversified farming followed, has great possibilities for the future; most of the farmers realize this and are working on a constructive soil-building program. The soil will require on an average of 1½ to 3½ tons of limestone to the acre to reach best results.

Our vocational agricultural teacher, W. L. Magruder, of the Macon high school, who with his class of boys has made an extensive study of the soil conditions of this county, realized that liming was our salvation. So Mr. Magruder and I, working together, conceived the idea last fall of our plan for liming, which I will discuss later.

Our plan could easily have been carried out through the Macon County Farmers' Association, except for the financial part; so for the time being we let the matter drop. Then, one day while in town, one of Macon county's prominent farmers, Mark White, who was desirous of doing some liming, brought up the subject to me. We decided talking would not get us anywhere, so Mr. White and I went to the presidents of each of the local banks, Judge S. P. Phillips of the Farmers Trust Co., Chris Maffry of the State Exchange, and Albert Smith of the Security Trust Co.

We put the proposition up to these men, who have a keen insight, and are interested in Macon county. They were pleased with it, and they decided that the three banks would loan $500 for one year, without interest, to a revolving fund for furnishing limestone at each railroad station in the county. At most of these stations the Missouri Farmers' Association has a Farmers' Exchange, which will care for the unloading and weighing of the limestone and the collection of the price from the farmers.

The plan is to unload a car of limestone at each given point, so it is available to the farmer the year around, whenever he wants it. The advantage of this is that

E. Dale Smart

when the individual had to order his own limestone shipped in, most generally it came at a time when the roads prohibited him moving it out of the car; and he had a demurrage charge or had to handle the limestone twice. The farmers are highly pleased with the idea that they can drive up, get a load of lime, pay for it, and go their way rejoicing.

Well, after our plan was published, letters and requests came pouring to the banks, Mr. Magruder and myself. When we got together we found that $500 would just get us well started. The bankers solved the problem by saying, "We'll just loan $400 each"; thus making a fund of $1200 for Macon county's limestone fund.

The next thing was to see the officials of the railroads; the Burlington, crossing the county east and west, was willing to cooperate and gave us every assistance; the Wabash, north and south, the same. So all that we needed then was to get busy. At the present time we have six cars coming from one quarry and expect during the year to use a great quantity of limestone in Macon county. We have 12 or 15 individuals taking a car each, besides a great number of groups of two or three farmers taking a car between them.

We have the limestone billed to the local point, the bill of lading comes to the local bank and the limestone is paid for; then as the money is collected from the farmers it is put back into the limestone fund. One local point, which has a car of limestone ordered, went to the bank there and got the bank to furnish money to just pay the county association for the car on the track, then they took care of it.

The city of Macon offered to weigh the lime free, but the city scales are rather hard to get to, so a local feed man, a Mr. Boedeker, who is interested in the farmers and had scales well located, is doing the job free.

The Macon County Farmers' Association, working in co-operation with the banks and individuals of Macon county, is doing its best to put limestone within reach of every farmer in Macon county.

We sincerely hope that if our plan is of benefit to other counties that they will follow it.

Fluorspar in Cupola Practice

THE general practice of adding fluorspar to limestone in the fluxing of a cupola to render the slag more fluid and leave the sulphur content in the iron melted has been the basis of a series of interesting tests recently carried out in Germany. These were reported in detail in *Stahl und Eisen* and in abstract in *Iron Age* from which the following is taken.

The tests consisted of cupola runs with high and low calcium limestones, limestone and normal fluorspar additions and limestone with varying fluorspar quantities. Some astonishing facts were brought out, all of which tend to show that the effective part of fluorspar is its lime content. The conclusions derived at from this extensive series of tests follows:

(1) With high grade limestones an addition of fluorspar for desulphurizing purposes is useless.

(2) A cupola slag, obtained with admixture of fluorspar to the limestone used, is more viscid and less basic than when limestone of a high purity alone has been used. This, because the silica and alumina content has been raised and the fluorine volatilized before the final stage of the slag formation has been reached, and it has covered the bulk of the molten iron.

(3) It is impossible to obtain desulphurization with fluorspar in cupola melting practice. The abstractor, Dr. Richard Moldenke, in his comments states that the tests indicate more than ever the need of research on the part of fluorspar producers to find out under what conditions of cupola operation and the degree of purity of the limestones used for fluxing their product will prove of actual value to the foundryman. That fluorspar is effective in open-hearth practice has been shown from the fact that up to 2.5% calcium fluorides has been found in slags when fluorspar was used for thinning down the slag.

Hints and Helps for Superintendents

Gravity Gravel Screen with Swinging Baffles

THE Escambia Gravel Corp., Flomaton, Ala., has its plant at Tarzan, Fla., which is 40 miles north of Pensacola and right on the Alabama line.

The gravel pebbles are smooth, rounded and water-worn and highly silicious, and the sand is clean and sharp. Very little clay or fine material is found in the deposit. In some places the gravel is slightly

Swinging baffles on gravity screen to prevent the flow from rushing over the screen

cemented or consolidated, but this consolidation is easily broken up by dropping charges of dynamite, which are exploded on the bottom in front of the suction dredge by which the deposit is worked. It is only occasionally that this has to be done.

The dredge is steam-driven and wood is used as fuel. This is not an uncommon practice along the Gulf coast and in Florida, where wood is plentiful. A good deal of fuel for this dredge is obtained by stripping the deposit, which is heavily wooded. The boiler is of the locomotive firebox type and is placed crosswise of the hull and a little back of center, thus balancing the weight of the pump and engine. The engine is belt-connected to an 8-in. American Manganese Steel Co.'s pump. Standard pipe is used for both suction and pontoon lines, and the pontoon line has the usual rubber sleeves to allow the dredge to swing.

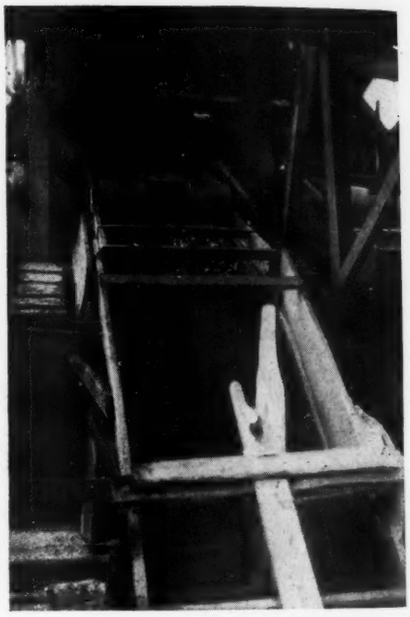
The pump discharge goes to a very efficient screening and washing plant. The sand, gravel and water are spread out on the usual fanning table to a width of about 20 ft. They strike against a gravity screen, with swinging baffles, which is set at about 45 deg., and this removes the sand very cleanly. This sand falls into a settling box which extends all the way under the screen. It has four discharge gates which are of an unusual type. Each gate consists of a quadrant in which are two holes, one about 3 in. in diameter, the other about 2 in. Either hole may be brought under the discharge, or by moving the quadrant farther the discharge may be shut off altogether. The quadrant is moved by a lever which is brought down to the level of the car that is being loaded so that the discharge of sand may be controlled from this point. There are advantages about a discharge gate of this type, one of which is that the wear is less than on some other forms.

The gravel, the oversize of the sand screen, runs over two shaking screens set in parallel. Each is 8 ft. long and 4 ft. wide. The frames are fixed and only the fabric vibrates. The vibration is caused by a simple eccentric motion connected to a link that is attached to the fabric. The rate of vibration is 3200 times per minute. Each screen is independently driven by a gas engine, one of Novo make, the other of Wood's make.

The screen fabric has a ½-in. mesh so that two sizes are made, pea gravel and coarser gravel, from about 2-in. to ½-in. There is no oversize in the deposit and hence no crushing is needed.

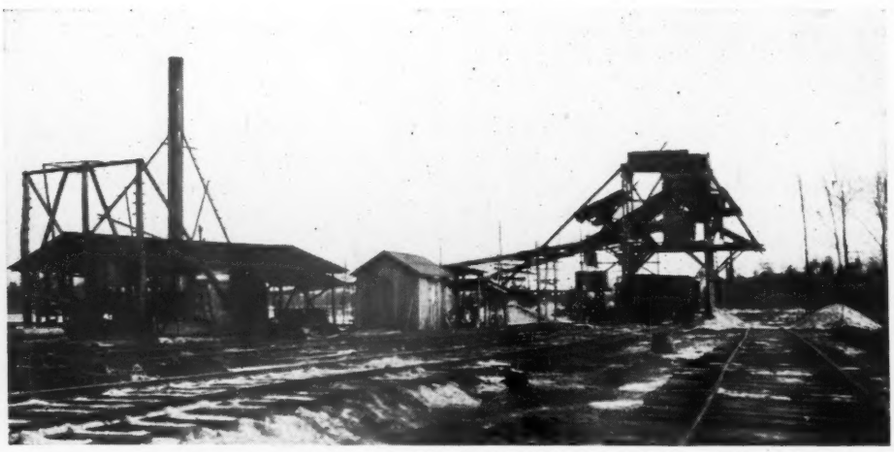
The coarse gravel falls down a chute and over a sort of picking table at which two men stand to pick out roots and pieces of trash.

Three cars are loaded at once, one with sand, one with fine gravel and one with coarse gravel. The deposit runs about one-third of each.



One of the two "home-made" vibrating screens at the Escambia plant

The office of the Escambia Gravel Corp. is near the plant, the postoffice address being Flomaton, Ala. M. A. Harrel is manager and Robert Knowles is superintendent.



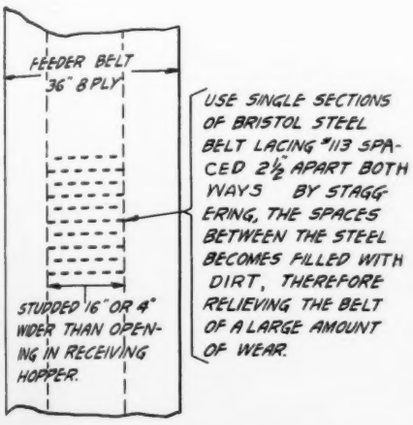
Dredge and washing plant of the Escambia Gravel Corp., Tarzan, Fla.

Preventing Slurry from Pugging Up in Rotary Kilns

THE chain system for this purpose described in ROCK PRODUCTS, November 27, 1926, issue, is an invention of F. L. Smidth & Co., Inc., Copenhagen, and is patented in all important countries, according to A. B. Zahn, assistant treasurer of the company. It was installed on the kilns at the Maria Island, Australia, cement mill by the Smidth company, whose engineers also designed and built the plant.

Increasing the Life of a Feeder Belt by Studding

THE following hint, contributed by L. E. Redding, superintendent of the Nickel Plate Sand and Gravel Co., Fairview, Penn., offers a good suggestion on how to increase the life of feeder belts in a simple, economical way. The only material required is steel belt lacing, and in this instance Bristol No. 113 was used.


FEEDER BELT
36" 8 PLY
USE SINGLE SECTIONS OF BRISTOL STEEL BELT LACING #113 SPACED 2½ APART BOTH WAYS BY STAGGERING, THE SPACES BETWEEN THE STEEL BECOMES FILLED WITH DIRT, THEREFORE RELIEVING THE BELT OF A LARGE AMOUNT OF WEAR.
STUDDED 16" OR 4" WIDER THAN OPENING IN RECEIVING HOPPER.

Studding the center section of conveyor belt increased its life

A 16-in. wide strip running in the center of the 36-in. feeder belt was studded with single sections of the steel belt lacing, spaced about 2½ in. apart and staggered. The spaces between the lacing became filled with dirt and in this way relieved the belt of a large part of the usual wear. Actual showings indicate, says Mr. Redding, that the belt has carried about three times the tonnage before studding and with much less wear.

Simple Multiplication Check

By ELMER P. WHEELER
Plant Clerk, General Crushed Stone Co., White Haven, Penn.

THE following example will serve to illustrate the application of a method called "striking out nines" for checking the solution of an arithmetical multiplication problem:

```
  3462
   219
------
 31158
  3462
 6924
------
758178
```

After having completed the above mathematical operation, the first step in the method is to add the digits of the multiplicand and the multiplier, which we find, in this case, to be 15 and 12 respectively. These results are each in turn divided by 9, and the remainders, 6 and 3 respectively, are multiplied together, with 18 as a result. Since 18 is exactly divisable by 9, the sum of the digits of the product should also be exactly divisible by 9, providing no error has been made in the solution of the problem. Checking the sum of the digits of the product will reveal that it is exactly divisible by 9 and the solution, therefore, can be considered correct.

In the practice of this method, if it is found that the sum of the digits of either the multiplicand or the multiplier, or both, is exactly divisible by 9, the sum of the digits of the product should also be divisible by 9. For example:

```
  459
   22
------
  918
 918
------
10098
```

From the above it will be noted that the sum of the digits of the multiplicand is exactly divisible by 9. Therefore the sum of the digits of the product should be exactly divisible by 9, and we find this is true, as the sum of the digits of the product in this case is 18.

To further illustrate the method when remainders are found in multiplicand, multiplier and product, the following example is submitted:

```
  2462
   337
-------
 17234
  7386
 7386
-------
829694
```

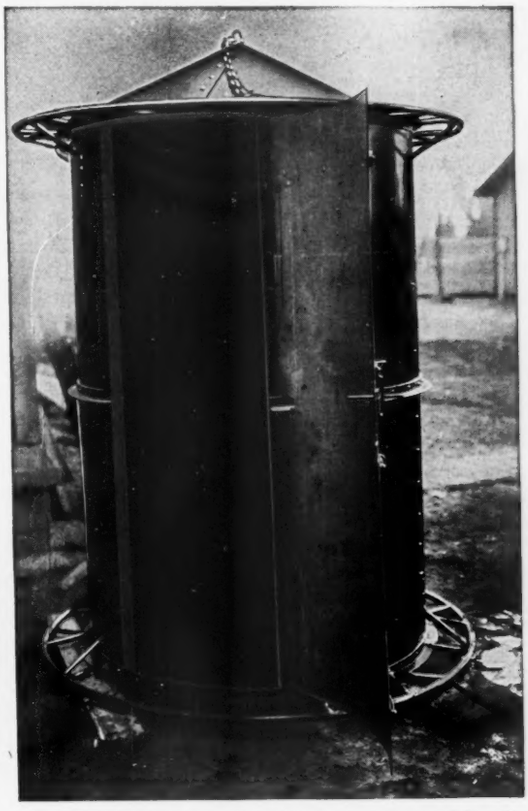
From the above it will be noted the sum of the digits of the multiplicand and multiplier is 14 and 13 respectively. Dividing each of these by 9, we have remainders of 5 and 4, which when multiplied give a result of 20, a figure divisible by 9 with 2 remaining. Therefore the sum of the digits of the product should show a remainder of 2 after being divided by 9. It will be noted that this is true in the above example and the solution, therefore, can be safely considered correct.

To simplify the method, it is unnecessary to take any notice of a figure 9 appearing in either the multiplicand, multiplier or product, since in the final analysis the 9's are stricken out. Similarly, a 7 and 2, or a 5 and 4, etc., may be ignored.

With a little thought and study this scheme can be employed frequently with definite assurance of reliability. It is, of course, not infallible, since a transposition of figures in the product would not affect a seemingly correct result. This is a rare occurrence, however, and the principle, therefore, can generally be accepted as effective. After having employed this method a few times it will be found that it can frequently be worked out at a glance. It will be found most useful, however, to men in the field, where access to calculating machines is not always available.

Portable Quarry Blast Shelter

SEVERAL types of quarry blast shelters have been described in this department at various times. Some of these have been home-made affairs which served the purpose very well. For all around utility however, the portable shelter described in a recent issue of the *Du Pont Magazine* and which is part of an excellent safety scheme followed by the Oliver Iron Mining Co., is hard to beat.



One of the sheet steel shelter houses used by the Oliver Iron Mining Co. for protecting workmen

This shelter is of sheet steel, cylindrical in shape with a rim set out from the top and another from the bottom to serve as wheels. When it is desired to move this shelter a short distance it is a very simple matter to tip it over on its side, roll it up to the new position and set it up again. This shelter also has a ring in the top so that it can be picked up by a wrecking crane and placed on a flat car for longer moves. It is a rule that one of these shelter houses must be kept immediately back of each steam shovel, so that there is no reason for anyone taking shelter beneath a shovel when a blast is fired. Additional shelter houses are provided at convenient places where blasting is being done, so that track crews and others may have a place of security at all times.

Other blast shelters of various types have been described in ROCK PRODUCTS, April 21, 1923, July 14, 1923, and November 28, 1925.

National Slag Association Re-elects All Officers

DURING the 10th annual meeting of the National Slag Association held at the Old Colony Club, Cleveland, Ohio, on April 8 the following officers were re-elected for the ensuing year:

C. L. McKenzie, president, Diamond Bank Bldg., Pittsburgh, Penn.; C. E. Ireland, vice-president, *Age Herald* Bldg., Birmingham, Ala.; H. J. Love, secretary-treasurer, 933 *Leader* Bldg., Cleveland, Ohio.

South Atlantic Quarrymen Form Association

TEN of the leading producers of crushed granite in the southeastern states have formed the South Atlantic Crushed Stone Association with headquarters at Columbia, S. C. It is expected that at least three other companies will join shortly which will make the organization cover South Carolina, southeastern North Carolina and southern Georgia. The first meeting after the organization meeting will be held in Columbia, April 18.

The companies already members are:

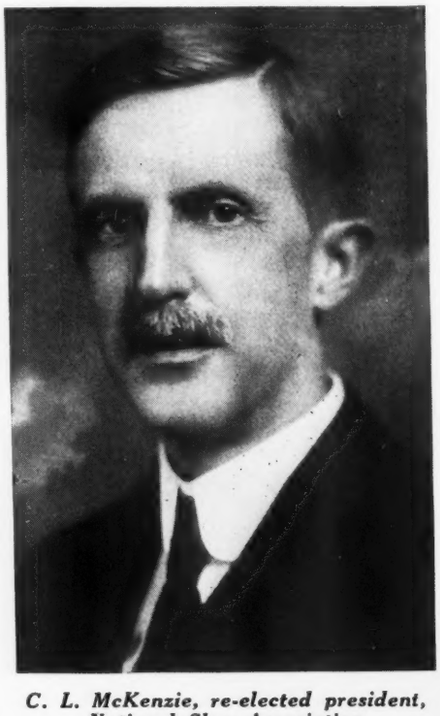
Southern Crushed Stone and Granite Co., Trenton, S. C.
Palmetto Quarries Co., Columbia, S. C.
Holston Quarry Co., Knoxville, Tenn.

C. E. Ireland, re-elected vice-president, National Slag Association

Raleigh Crushed Stone Co., Oroonville, N. C.
Raleigh Crushed Stone Co., Raleigh, N. C.
Hardaway Contracting Co., Woodleaf, N. C.
Hiddenite Quarry Co., Hiddenite, N. C.
Macon Granite Co., Macon, Ga.
Pacolet Quarries, Spartanburg, S. C.
Weston and Brooker, Columbia, S. C.

Following are the officers for the ensuing year:

President, T. I. Weston, of Weston and Brooker; first vice-president, Lon White, of Hardaway Contracting Co.; second vice-president, W. H. Cook, of Raleigh Crushed Stone Co.; secretary, Richard Simons.



C. L. McKenzie, re-elected president, National Slag Association

The present membership of the association represents a production of 3,000,000 tons.

Rumored Change of Control in Rockport Granite Company

A RECENT dispatch in the New York *Journal of Commerce* states that New York interests have acquired control of the Rockport Granite Co., Rockport, Mass., the largest quarry of its kind in the country. The report states that the identity of the controlling interests is not revealed, as their acquisitions of stock have been conducted under a veil of secrecy. The former owners were said to be greatly surprised when it was announced that new interests acquired 1526 of the 3000 shares outstanding.

Rockport Granite Co. operates a large part of the granite industry on Cape Ann and also operates quarries in Maine. The company's capitalization is $300,000. The physical assets are valued at $750,000. The company employs an average of 700 men, with a weekly payroll of between $6000 and $10,000. The company was organized in 1864. During its 62 years of operation it gradually has absorbed all neighboring concerns and for the past 25 years has entirely controlled the Cape Ann quarrying industry.

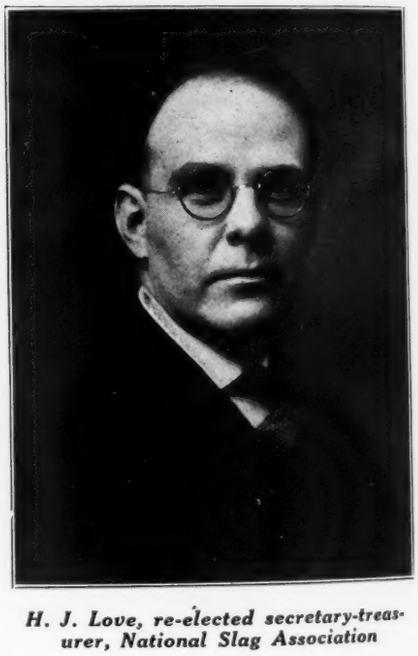
At the meeting called for April 11 future policies of the company are to be determined.

Although the new interests have been acquiring stock over a number of years, its actual transfer on the company's books was not made until recently. The stock stands in the name of a clerk, M. Turner Brockway, of New York. C. P. Northrop, New York attorney, appeared at the company's offices recently and making known his identity ordered suspension of all activities. He declined to make any statement.

Through the deal the contract of the city of Gloucester is said to have been affected. The city had an agreement with the granite company, running until January 1, 1933, for the supply of stone to the city for crushing purposes. Superintendent Barrett later issued an announcement saying that the company will resume furnishing the city with stone at an early date. It is expected that plants of the new interests will be made known within a short time.

Kaw Valley Drainage Board Sand Plant in Operation

THE sand plant recently built by the Kaw Valley Drainage Board at Kansas City, Kas., according to reports is about ready to start operations. The testing says the Kansas City (Kas.) *Kansan*, is over and the finishing touches completed. About 2500 yd. of sand, the result of three days operation are said to be in the stock pile ready for removal. A permanent road has replaced the temporary one leading from the plant and this will accommodate the trucks hauling sand. The operations are in charge of Harry Bruce.



H. J. Love, re-elected secretary-treasurer, National Slag Association

An earlier report published in ROCK PRODUCTS' April 2 issue, contains a brief description of the plant and operation methods.

Editorial Comment

Portland cement imports in 1926 were about 2½% of the total consumption of portland cement in the United States. Some people think that this is too insignificant to talk about. Although 2½%, or 4,000,000 bbl., is the annual output of three fair-sized cement mills, it might be considered insignificant if spread over the whole cement-consuming area of the United States; but, concentrated as it is at a few seaports, it is no insignificant factor to a large group of American cement mills which were built to serve those markets. These mills are compelled to seek other markets, already well supplied, or to curtail production, or to meet the price of the imported product.

Where 2½% Is Sufficient

Of these three evils one could hardly be selected which does not do much harm to American industry and to the very basis of American prosperity. If the mills which have been supplying Boston, New York, or San Francisco with 1,000,000 bbl. or more a year turn to interior markets with this material, the mills now serving these interior markets must likewise invade other markets, and soon the orderly and prosperity-making routine of the entire industry is upset and market conditions become chaotic—all because of only 2½% imports.

The second alternative is to curtail production; but every experienced cement manufacturer knows that capacity production is the one big factor in keeping down production costs—that present production costs and selling prices are possible only because the plants are working nearly to their capacity. A plant designed to produce 1,000,000 bbl. per year will have nearly the same total cost of production when operating to produce only 500,000 bbl. But the total cost of production spread over 1,000,000 bbl. is quite different from that spread over 500,000 bbl. Therefore no manufacturer can curtail production very appreciably and expect to keep his costs anywhere near those of competitors who are operating at or near capacity production—therefore 2½% imports may cause some American mills to go out of business.

The third alternative is to meet the foreign cement price. This foreign cement is imported *only* because it is lower in price. Because of cheap labor, cheap transportation, low handling costs, and present rates of exchange, foreign cement can continue to be sold for a lower price than the domestic article. To cut prices to meet that of the imported material is merely to invite still lower prices until such prices become so low that only foreign manufacturers can get by with a price that will cover production costs—which will encourage the building of plants abroad to fill orders—and the flood of imported material will increase and some of the American mills will be compelled to cease operation—all, possibly, because of 2½% imports.

If price-cutting to meet foreign competition could be confined to the few localities where the foreign cement is landed, the situation might not be so bad, but in this country a splendid spirit of open-handed honesty in business has grown up—that of playing no favorites. Every dealer in portland cement, every user of portland cement—and indeed of most other commodities made in America—may be certain that he is buying his material for the same price and under the same conditions his competitors buy for. How can this policy of fair and open-handed dealing be continued if manufacturers must reduce prices to dealers and users in certain localities to meet the price of the foreign material? Naturally, other nearby dealers cannot see why they should not be treated the same as always; for there are no sharp lines of division between distribution territories. They blend into one another. Thus the mischief, once begun, is practically endless. The New England situation today in the portland cement industry is growing proof of this.

Just as conditions in one distribution territory affect those in another, so conditions in one American industry are sooner or later reflected in others. A folder issued by the National Builders' Supply Association, Cleveland, Ohio, states:

Every producer is a consumer. The cement industry alone spends $63,000,000 annually for goods other than raw materials needed in manufacturing its product. Industries which sell these suffer as cement suffers. The cement industry with its investment of approximately $500,000,000 in more than 145 plants in 31 states, is the fourth largest shipper of manufactured goods and the largest manufacturing consumer of coal in the United States. Other large industries, such as those manufacturing brick, plate glass, steel and pig iron, are similarly threatened by unequal foreign competition. Such a situation concerns directly the pocketbook and well-being of everyone in the United States.

The following table, based on importation of approximately 10,000,000 bbl. of foreign-made cement in three years shows how a resulting loss of $29,000,000 has been spread over other industries directly affected:

Net Loss to American Cement Industry (The largest single item of which is wages and salaries)		**$16,315,600**
Loss to Coal and Oil Industries (Not including freight)		**1,512,500**
10,000,000 bbl. of cement, 130 lb. of coal per bbl. at $2.25 per ton	$1,462,500	
(Coal for railroads and other correlated industries is included under individual headings)		
Lubricants:		
Cost of lubricants (averages ½ cent per bbl. of cement)	$50,000	
Loss to Power Companies		**1,700,000**
Per bbl. of cement, 17 kwh. at 1 cent (includes coal, its freight and labor)		
Power for correlated industries included under individual headings		

(Continued on next page)

Loss to Railroads (at present freight rates)		**7,182,400**
Freight charges on—		
Coal used in cement manufacturing, 650,000 tons, average $1.00	$650,000	
Cement (finished); 10,000,000 bbl., average 63½ cents	6,350,000	
Gypsum, 57,000 tons, average $3.20	182,400	
Loss to Sack Manufacturers		**960,000**
(Average, 5 trips each sack. 10,000,000 bbl. = 40,000,000 sacks ÷ 5 = 8,000,000 sacks at 12 cents. This includes cotton, labor, freight)		
Loss to Explosives Manufacturers		**130,000**
(Cost of explosives averages .013 per bbl. of cement. Includes labor, freight, power, etc.)		
Loss to Manufacturers of Miscellaneous Supplies and Repair Parts		**1,000,000**
(Cost of supplies and parts averages 10 cents per bbl. of cement)		
Loss to Gypsum Industry		**199,500**
(57,000 tons at $3.50 per ton, not including freight)		
		$29,000,000

Incidentally, the above itemized tabulation answers the question raised by Consul A. Holter, managing director of the A. G. Dalen Portland Cement Fabrik, Brevik, Norway, in his letter to the editor (published in ROCK PRODUCTS, February 5, 1927, p. 100). In attempting to answer an open letter of H. Struckmann, president of the International Cement Corp., to President Coolidge, pointing out the effects of portland cement importations, Mr. Holter was unable to see where the $29,000,000 loss to American industry could be accounted for.

Further in regard to Mr. Holter's letter to ROCK PRODUCTS it is very interesting to note that shortly afterward Mr. Holter had occasion to take a stand on identically the same problem, but in this case as a domestic portland cement manufacturer, faced with cut-price competition in Norway, instead of as an exporter of cement to the United States. We entirely sympathize with Mr. Holter in his views as a Norwegian cement manufacturer fighting for his home markets, and we are only sorry that he cannot view our identical American problem from the same angle and with the same understanding that he does his home problem.

As recently as two months ago Mr. Holter was addressing the editor of *Norway's Sea and Commerce Journal,* indignantly demanding that a Norwegian government trust control official be expelled from office because he had questioned the profits and trade practices of the Norwegian portland cement industry.

Mr. Holter wrote:

The Norwegian cement industry has had, like so many other industries during the last few years, great difficulties to combat. The domestic markets, as well as the export markets, have dwindled and the purchasing power has been reduced, with prices falling much faster than the drop in manufacturing cost would justify.

We are today paying wages, which transferred into Norwegian kroner, are from 50 to 80% higher than wages in the other Scandinavian countries with a normal exchange, or about 700% above the wages paid in some of the weaker exchange countries of Europe. The unfavorable position of the increase in the kroner value has added the dumping evil from other countries to the Norwegian industry. The Norwegian industry, similar to the cement industry in other places in the world, has endeavored to protect itself against unsound competition by having mutual agreements with the most powerful foreign cement industries and the necessity of this has been recognized everywhere. In many countries they have even gone further—in that the State itself has taken steps to protect the country's own interest against unsound foreign competition. In our land, with high labor wages, and constant increase of idle labor, it ought to be doubly necessary to look at this question in a sensible and unbiased way, especially as we, as far as cement is concerned, are located in the direct route of several countries weak in their exchange. Thanks to the co-operation and understanding of commercial industry and supported by the cement consuming public, who everywhere has looked on these conditions in an appreciative and national spirit, the cement industry, even though with difficulty, has been able to hold its own. The thing that has contributed to this most has been that the Norwegian consumers have seen that it was to their advantage to use Norwegian cement of the highest quality and guaranteed uniformity which insured them against loss due to failures in the preparation of concrete structures.

During the last few days, however, a new and threatening danger has developed in one of the State's own departments paid by the taxes which Norwegian labor and Norwegian activities have contributed. Mr. W. Thagaard, Chief for the Government's Control Bureau, some time ago sent the Norwegian cement producers a circular in which he, among other things, requests an accounting of the methods used in the cement commerce as outlined by a committee named by himself in the year 1923. The main issue of the proposition is that there ought to be assistance given to the importation of foreign cement.

* * * * *

The Norwegian cement industry at the present time comprises four factories with a total productive capacity of 2,000,000 bbl., or approximately 340,000 tons a year. The industry pays in wages to Norwegian workmen and agents about Kr. 7,500,000. The industry further purchases yearly materials of Norwegian origin and pays for Norwegian water power, insurance, etc., Kr. 1,800,000. The Norwegian cement industry also pays to Norwegian ships Kr. 3,900,000, so altogether they contribute to the country's resources directly approximately Kr. 12,000,000, which amount, largely through export, is secured from foreign countries. To this can be added the earned interest on the invested capital as well as the profits on sales, etc. It is this Norwegian industry that Mr. Thagaard, in his circular, has delivered to foreign dumping competitors and that those interested in dumping will use this opportunity there can be very little doubt about, especially if they think they have the authority's approval. Does Mr. Thagaard think that a dumping importation will compensate for this? Does he think that the consumers or sellers of dumped cement will support the men who will be out of work and support the communities whose existence depends on this industry? And does Mr. Thagaard think that the foreign industries will produce for our shipping industry the freight amount which it will lose through the distribution of Norwegian cement? Mr. Thagaard undoubtedly cannot realize the extent to which his actions may reach. There is in these days published, time and time again, that it is necessary to help the Norwegian industry in another way. Mr. Thagaard's lack of experience in practical life makes him a serious danger for our industrial life. His political "ball play" with the ablest interest in industrial activity is not in keeping with the policy which is necessary if industry is to thrive at all. Mr. Thagaard should take the consequences of this and get out.

One would almost conclude from the foregoing that Mr. Holter had had the benefit of the analysis made of the loss to American business from the importation of 10,000,000 bbl. of cement. Certainly, we are indebted to Mr. Holter for as plain and true a statement, and as convincing an argument against the importation of cement into the United States, as we, ourselves, or we believe, any American portland cement manufacturer could have written.

It would be unkind and uncharitable to recall some of the phrases Mr. Holter used in his letter of February 5, 1927, replying to Mr. Struckmann's position on imports of foreign cement into the United States. For

we in the United States sympathize whole-heartedly with the people of Europe in the hardships brought upon them by the world war. But we are not easily convinced that we shall be helping the people of Europe by lowering our own standards of wages and living to meet theirs. Nor it is necessary that this country accept cheaply made foreign materials in payment of debt. The flood of American travelers to Europe before the war was already beginning to be an enormous influence on international exchange. It is fast getting to the point now where Europeans may well spend their energies and talents to better advantage in extracting the interest and principal of war debts from American visitors than in attempting to impoverish Americans so that European travel in the character and quantity it exists today will become impossible.

It has always seemed to us that perhaps the most important contribution the United States has made to world progress and world happiness is the demonstration given of sharing our national wealth and prosperity with all classes and conditions of citizens. High wages, fair and consistent profits, fewer working hours, efficient and specialized production methods have given practically all our citizens steady jobs, relatively high incomes, and leisure to spend and to buy and to enjoy many of the luxuries of life as well as necessities. We will do the world more good, it strikes us, by continuing the example, or demonstration, than by reverting to conditions of low wages, long hours and intermittent operation, necessary if we are compelled to meet present manufacturing and producing costs in Europe.

How much better it will be for them, when they see the same light, to build concrete roads, use automobiles, buy radios—in short, have a well distributed medium of exchange, and keep it busy circulating, as we try to do here.

Union Boycott of Indiana Limestone Products Ruled Unlawful

IN an important labor controversy the supreme court of the United States through Associate Justice Sutherland reversed the United States circuit court of appeals for the seventh circuit and held that the Bedford Cut Stone Co. of Indiana and 23 other corporations engaged in quarrying or fabricating limestone are entitled to relief by injunction against the Journeymen Stone Cutters Association of North America, Michael W. Mitchell, individually, and others.

The case involves a long standing controversy between corporations engaged in the limestone business in the Bedford-Bloomington district of Indiana, and the stone cutters' organization.

Anti-Trust Act Infringed

By a divided court it was held that the acts and conduct of the stone cutters fall within the terms of the anti-trust act and that the corporations are entitled to relief under the Clayton act.

Justice Sutherland held that the strikes, ordered and carried out with the sole object of preventing the use and installation of the product of the corporations in other states necessarily threatened to destroy or narrow their interstate trade by taking from them their customers.

The court further held that it was beside the point that the labor organizations in general purpose and in and of themselves were lawful and that the ultimate result aimed at may not have been illegal in itself.

It held that the means adopted by the labor organizations were unlawful and that in such a case the innocent general character of the organizations adopting them, or the lawfulness of the ultimate end sought to be attained cannot serve as a justification.

Enjoined From Conspiring

The suit was brought by the Bedford Cut Stone Co. and other corporations against the general union of the stone cutters and some of its officials and a number of affiliated local unions and some of their officers to enjoin them from combining and conspiring together to commit various acts in restraint of interstate commerce in violation of the anti-trust act and from committing what was alleged by the corporations to be great and irreparable damage.

In the original proceeding it was charged that the unions, in an attempt to bring about a "closed shop" in the industry, ordered its members, including 5000 stone cutters, curb setters and cutters, and others working on cut stone, throughout the United States and Canada, to refuse to handle stone quarried or cut by nonunion labor. Evidence was offered to show that pressure had been exerted upon contractors, builders and the members of other unions to further the scheme.

The majority opinion of the supreme court held that while the union itself was undoubtedly legal, and the end it sought to attain was legal, the means adopted to secure the desired end was illegal. A number of earlier decisions of the court were cited.

The majority opinion, written by Mr. Justice Sutherland, held that, whatever the strikers' motives, they had "deliberately adopted a course of conduct which directly curtailed or threatened to curtail the natural flow in interstate commerce of a large proportion of building limestone, to the probable disadvantage of the public."

Justice Brandeis filed a dissenting opinion and Justice Holmes concurred in the dissent. Justice Stone and Justice Sanford in separate opinions concurred with the majority. Justice Braindeis in effect upheld the action of the organized stone cutters and contended there was no unreasonable restraint on interstate commerce.

Rock Asphalt Producers Merge

THE world's largest producers of rock asphalt under one corporate management will be the result of a consolidation of rock asphalt properties in Kentucky and Alabama, according to announcement in the Rome (Ga.) *News*.

The new corporation will be known as the United Rock Asphalt Co. with headquarters in the Inter-Southern Bldg. William E. Massey is chairman of the board of directors of the new company.

Mr. Massey said that all the properties of the Rock Asphalt Co. of America, of which he is president, are going into the new company. Their new modern electrically equipped plant on Green river in Edmondson county, with a capacity of 2000 tons a day, a plant at Black Rock, Ky., and one at Decatur, Ala., are in the new corporation. The three combined plants will have a capacity of 3000 tons a day, which is said to be the world's largest production under one corporate management.

All of these plants now have orders for their products which will keep them running for the next year, it was said.

The complete financial plan has not yet been given out, but it is said that there will be 3,000,000 shares of preferred stock and 100,000 shares of no par common. The properties of the Rock Asphalt Co. of America go in at $1,000,000 preferred and others at $350,000.

Officers of the United Rock Asphalt Co. are: President, Fred T. Fitzharris; secretary, Fred H. Mertens, and treasurer, J. D. Kellar. A. C. Leathers is sales manager.

Operating offices will be maintained at other places throughout the country, but the headquarters will be at Rome, Ga.

Sand-Lime Brick Production and Shipments in March

THE following data are compiled from reports received direct from 28 producers of sand-lime brick located in various parts of the United States and Canada. The number of plants reporting is three less than those furnishing statistics for the February estimate published in the March 19 issue. The statistics below may be regarded as representative of the entire industry, the reporting plants having over two-thirds the production capacity in the United States and Canada.

Production, shipment and unfilled orders in the past month showed a great improvement and from now on will undoubtedly continue to increase. Building activity apparently is well under way and the sand-lime brick industry is getting its share. The large volume of unfilled orders (for this time of the year) will keep the plants working at a capacity or near-capacity rate for some months to come. Some of the producers have enjoyed an unusually good quarter. One Wisconsin manufacturer writes: "Business for the first quarter has been a surprise to us. We have delivered more brick the first three months in 1927 than for the same period in any previous year." It is also interesting to note that the North Indiana Brick Co. are furnishing the brick for the two side walls and rear wall of the new Mather building in Chicago. This is a 23-story building and will require about 300,000 brick. The interest lies in the fact that sand-lime brick can compete successfully in the strongest clay brick market in the United States—Chicago!

Prices were up a little over the last month. The following are the average prices received for sand-lime brick in March:

Shipping point	Plant price	Delivered
Lake Helen, Fla.	$10.00@15.00	.....
Pontiac, Mich.	14.50	$16.00
Detroit, Mich.	.....	17.50
Hartford, Conn.	14.00	17.00
Dayton, Ohio	12.50	.....
Jackson, Mich.	12.25	.....
Saginaw, Mich.	11.50	.....
Menominee, Mich.	11.00@12.00	14.50
Boston, Mass.	.....	16.00
Winnipeg, Manitoba	12.00	14.00
Michigan City, Ind.	11.00	.....
Toronto, Ontario	11.50	13.50
Detroit, Mich.	13.50@15.00	16.30
Detroit, Mich.	*13.00	†15.10
Minneapolis, Minn.	10.00	.....
Albany, Ga.	10.00	.....
Detroit, Mich.	.....	17.00
Rochester, N. Y.	.....	19.75
Toronto, Ont.	.....	‡13.75
Hummelstown, Penn.	11.00	.....
Milwaukee, Wis.	10.50	13.00
Flint, Mich.	12.00	.....
Buffalo, N. Y.	12.25	16.75
Syracuse, N. Y.	18.00	20.00
Plant City, Fla.	9.00@12.00	.....

*Less 5. †Net. ‡Ex. tax.

The following statistics are compiled from data received direct from 28 producers of sand-lime brick in the United States and Canada:

Statistics for February and March, 1927

	February*	March†
Production	9,679,000	16,748,000
Shipments (rail)	5,843,000	7,707,000
Shipments (truck)	6,792,000	10,811,000
Stocks	13,866,000	13,802,000
Unfilled orders	18,580,000	25,415,000

*33 plants reporting. Revised to include two plants not furnishing February data previously.

†Incomplete, two plants not giving data on stocks and eight plants not giving unfilled orders.

New Plant at Brooklyn

The Paramount Brick Co. is building a four-press plant at Brooklyn, N. Y., with allowance for future installation of two more presses, or a total of six. The mill when completed will operate on a two-shift basis with an estimated production of 300,000 brick per day. The machinery is being furnished by the Komnick Machinery Co., Detroit, who are also doing the installation work.

Several producers report new contracts for brick. Among them are the Sand Lime Products Co., Detroit, who will supply the brick for the new Fordson State bank, the University of Detroit buildings, hotel buildings and some manufacturing structures. The Paragon Plaster Co., Syracuse, N. Y., are supplying the brick for the new C. C. Davison Milling Co. building at Geneva, N. Y., Hamilton, N. Y., high school, the New York Telephone building and the new postoffice and court house at Syracuse.

National Lime Association Convention

THE ninth annual convention of the National Lime Association will be held May 17, 18 and 19, 1927, at the Greenbriar hotel, White Sulphur Springs, W. Va., beginning with a group luncheon on Tuesday, May 17.

Wednesday, May 18, will be given over to a full discussion, open to all manufacturers, whether members or not, of the most important problems before the industry, Promotion and Selling. It is anticipated that more real value will be derived from this session than has ever resulted from any previous convention, and it is hoped that every manufacturer of any consequence in the industry will be in attendance and will participate. The discussion will be divided into sections, each being led by a producer who has given special thought and attention to the particular phase of the subject he will discuss in detail.

The tenor of the whole convention will be how the industry can best be developed. So that the maximum time may be available for informal discussions and recreations, no tournaments have been arranged. There will be, however, a banquet on Wednesday night, May 18.

All lime producers, and particularly those who are not at present members of the association, are cordially invited to attend the convention and to take an active part in the discussions.

Crystal River Rock Company Completing Improvements

THE improvements and installation of new machinery at the Crystal River Rock Co. plant amounting to $120,000, which have been under way for the past several months, will be entirely finished within a short time according to an announcement by G. L. Abbott, general manager.

This plant which is located about three miles east of Crystal river, near Inverness, Fla., is being increased to a 4000 tons daily capacity.

The face of the deposit has been exposed to a depth of about 120 ft. Rock is loaded at the quarry into dump cars and carried to the plant for primary reduction. An electric shovel and a steam shovel, each of 2-yd. capacity are used for loading. There are at present four crushers installed, two for primary crushing and two for secondary.

The entire plant is electrically driven, a total of 750 hp. being represented by the motors in use. At the present time about 50 to 60 cars a day are being shipped. Four sizes are made at the plant: Screenings, 5/8-in., 3/4-in. and railroad ballast.

The other officers of the company are J. Y. Clark, Leesburg, president; G. G. Ware, Leesburg, secretary-treasurer.—*Inverness* (Fla.) *Chronicle.*

Saticoy Gravel Co. Acquires Ventura Company

A RECENT report in the Los Angeles (Calif.) *Times* states that the Ventura Rock and Gravel Co., which began operations north of the city limits of Ventura, Calif., in October, 1925, has been sold by its owners, E. M. Hawley and J. A. Renfro, to the Saticoy Rock Co. While the price was not announced, it was understood to run into six figures.

Starting in October, 1925, with a small plant that put out only a few yards of rock and gravel a day, the Ventura Rock and Gravel Co. rapidly grew until at the time the deal was consummated the company was producing between 700 and 800 yd. a day.

Mr. Renfro is to remain for a time with the company as plant manager, while Mr. Hawley is as yet undecided as to the future plans. Before coming to Ventura the two were in the gravel business in Los Angeles county, California.

Financial News and Comment

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

(These are the most recent quotations available at this printing. Revisions, corrections and supplemental information will be welcomed by the editor.)

Stock	Date	Par	Price bid	Price asked	Dividend rate
Allentown Portland Cement Co. (common)[32]	Apr. 11	.....	2	4	
Allentown Portland Cement Co. (6% bonds, 1932)[32]	Apr. 11	.....	87	92	
Alpha Portland Cement Co. (common)[2] new stock	Apr. 12	No par	38	40	37½c quar. Apr. 15
Alpha Portland Cement Co. (preferred)[2]	Apr. 12	100	115	.....	1¾% quar. Mar. 1
American Lime and Stone Co. (7% bonds, 1942)[32]	Apr. 11	.....	97	101	
Arundel Corporation (sand and gravel—new stock)	Apr. 11	No par	34½	35	50c April 1
Atlantic Gypsum Products Corp. (1st 6's carrying 10 sh. com.)[10]	Apr. 12	.....	114	.....	
Atlas Portland Cement Co. (common)[2]	Apr. 12	No par	41	43	50c qu. March 1
Atlas Portland Cement Co. (preferred)	.....	100	.....	.....	2% quar. Oct. 1
Atlas Portland Cement Co. (preferred)[2]	Apr. 12	33⅓	43	.....	2% quar. Apr. 1
Beaver Portland Cement Co. (1st Mort. 7's)[8]	July 29	100	100	100	
Bessemer Limestone and Cement Co. (Class A)[4]	Apr. 8	.....	34	34¾	
Bessemer Limestone and Cement Co. (6½% bonds)[4]	Apr. 8	.....	99	100	
Boston Sand and Gravel Co. (common)	Apr. 8	100	70	.....	1% qu., 2% ex. Jan. 1
Boston Sand and Gravel Co. (preferred)	Apr. 8	.....	.....	85	1¾% quar. Jan. 1
Boston Sand and Gravel Co. (1st preferred)	Apr. 8	.....	.....	90	2% quar. Jan. 1
Canada Cement Co., Ltd. (common)	Apr. 11	100	145	146	1¾% April 16
Canada Cement Co., Ltd. (preferred)[11]	Apr. 11	100	118	.....	1¾% quar. Feb. 16
Canada Cement Co., Ltd. (1st 6's, 1929)[11]	Apr. 11	.....	101	102	3% semi-annual A&O
Canada Crushed Stone Corp., Ltd. (6½s, 1944)[11]	Apr. 11	100	106	110	
Charles Warner Co. (lime, crushed stone, sand and gravel)	Apr. 11	No par	23½	24½	50c Apr. 11
Charles Warner Co. (preferred)	Apr. 11	100	101	.....	1¾% quar. Apr. 28
Charles Warner Co. (lime, crushed stone, sand and gravel) 7s, 1929[16]	Apr. 8	100	102	103½	
Cleveland Stone Co. (new stock)	Apr. 12	.....	48½	49	50c qu. June 15
Connecticut Quarries Co. (1st Mortgage 7% bonds)[17]	Apr. 8	100	104	.....	
Consolidated Cement Corp. (1st Mort., 6½s, series A)[24]	Apr. 12	100	97	99	
Consolidated Cement Corp. (5 yr. 6½% gold notes)[24]	Apr. 12	100	96	100	
Consumers Rock and Gravel Co. (1st Mort. 7s)[13]	Apr. 8	100	99½	101½	
Coosa Portland Cement Co. (6% bonds, 1944)[32]	Apr. 11	.....	70	.....	
Coplay Portland Cement Co. (6% bonds, 1941)[32]	Apr. 11	.....	88	.....	
Dewey Portland Cement Co. (1st mort. 6's 1942)[30]	Apr. 12	100	98½	100	
Dolese and Shepard Co. (crushed stone)[7]	Apr. 11	50	95	100	$1.50 Jan. 1, $1.50 ex. Jan. 1
Egyptian Portland Cement Co. 7% pfd.[21]	Apr. 8	.....	85	95	1¾% quar. Oct. 1
Egyptian Portland Cement Co. (common)[21]	Apr. 8	.....	5	7	40c quar. Oct. 1
Fredonia Portland Cement Co. (6½% bonds, 1940)[32]	Apr. 11	.....	97	101	
Giant Portland Cement Co. (common)[2]	Apr. 12	50	55	65	
Giant Portland Cement Co. (preferred)[28]	Apr. 12	50	40	50	3½% and 19% ex. Dec. 15
Ideal Cement Co. (common)	Apr. 11	No par	84	86	$1 quar., $1 ex. Dec. 15
Ideal Cement Co. (preferred)[33]	Apr. 11	100	111½	113	1¾% quar. Dec. 15
International Cement Corporation (common)	Apr. 11	No par	52½	53	$1 quar. Mar. 31
International Cement Corporation (preferred)[2]	Apr. 11	100	107¾	108	1¾% quar. Mar. 31
Kelley Island Lime and Transport Co.	Apr. 12	100	133	135	$2 quar. April 1
Lawrence Portland Cement Co.[3]	Apr. 11	100	98	101	2% quar.
Lehigh Portland Cement Co.[6]	Apr. 12	50	96	100	1½% quar.
Lyman Richey Sand and Gravel Co. (1st Mort. 6s, 1928 to 1931)[13]	Apr. 8	100	99	100	
Lyman Richey Sand and Gravel Co. (1st Mort. 6s, 1932 to 1935)[13]	Apr. 8	100	97	99	
Marblehead Lime Co. (1st Mort. 7's)[14]	Apr. 8	100	100	.....	
Marblehead Lime Co. (5½% notes)[14]	Apr. 8	100	98	.....	
Michigan Limestone and Chemical Co. (common)[6]	Apr. 12	.....	26	28	
Michigan Limestone and Chemical Co. (preferred)[6]	Apr. 12	.....	24	26	1¾% quar. July 15
Missouri Portland Cement Co.	Apr. 11	25	48⅜	49	50c Feb. 1
Monolith Portland Cement Co. (common)[9]	Apr. 8	.....	12⅜	12¾	8% ann. Jan. 2
Monolith Portland Cement Co. (units)[9]	Apr. 8	.....	31⅛	32¼	
Monolith Portland Cement Co. (preferred)[9]	Apr. 8	.....	9⅜	9¾	
National Gypsum Co. (common)[35]	Apr. 12	.....	40½	42½	
National Gypsum Co. (preferred)[35]	Apr. 12	.....	80	.....	
Nazareth Cement Co.[20]	Apr. 8	No par	29	31	75c quar. Apr. 1
Newaygo Portland Cement Co.[1]	Apr. 8	.....	115	120	
Newaygo Portland Cement Co. (6½% bonds, 1938)[32]	Apr. 11	.....	100	102	
New England Lime Co. (Series A, preferred)[14]	Apr. 8	100	.....	95	
New England Lime Co. (Series B, preferred)[23]	Apr. 12	100	95	97	
New England Lime Co. (V.T.C.)[23]	Apr. 12	.....	33	36	
New England Lime Co. (6s, 1935)[14]	Apr. 8	100	99	101	
New York Trap Rock Corp. (6% bonds, 1946)[32]	Apr. 11	.....	97½	100	
North American Cement Corp. 6½s 1940 (with warrants)	Apr. 11	100	90	90	
North American Cement Corp. (units of 1 sh. pfd. plus ½ sh. common)[22]	Mar. 25	.....	70	80	2 mo. period at rate of 7%
North American Cement Corp. (common)[19]	Nov. 8	.....	20	22	
North American Cement Corp. (preferred)	Jan. 28	.....	.....	.....	1.75 quar. Feb. 1
North Shore Material Co. (1st Mort. 6's)[15]	Apr. 12	100	98½	100	
Pacific Portland Cement Co., Consolidated[4]	Apr. 9	100	62½	74	25c mo.
Pacific Portland Cement Co., Consolidated (secured serial gold notes)[4]	Apr. 9	100	97½	98	3% semi-annual Oct. 15
Peerless Portland Cement Co.[1]	Apr. 8	10	4⅞	5¼	
Pennsylvania-Dixie Cement Corp. (1st Mort. 6's)[29]	Apr. 11	100	101	101	
Pennsylvania-Dixie Cement Corp. (preferred)[29]	Apr. 11	100	99	99	1¾% March 15
Pennsylvania-Dixie Cement Corp. (common)[29]	Apr. 11	.....	32⅝	34⅛	80c April 1
Petoskey Portland Cement Co.[1]	Apr. 9	10	9½	10	1½% quar.
Pittsfield Lime and Stone Co.[31]	Feb. 25	.....	.....	100	
Pittsfield Lime and Stone Co.[31] (common)	Feb. 25	.....	.....	25	

(CONTINUED ON PAGE 80)

[1]Quotations by Watling, Lerchen & Hayes Co., Detroit, Mich. [2]Quotations by Bristol & Willett, New York. [3]Quotations by True, Webber & Co., Chicago. [4]Quotations by Butler, Beading & Co., Youngstown, Ohio. [5]Quotations by Freeman, Smith & Camp Co., San Francisco, Calif. [6]Quotations by Frederic H. Hatch & Co., New York. [7]Quotations by F. M. Zeiler & Co., Chicago, Ill. [8]Quotations by Ralph Schneeloch Co., Portland, Ore. [9]Quotations by A. E. White Co., San Francisco, Calif. [10]Quotations by Lee, Higginson & Co., Boston and Chicago. [11]Nesbitt, Thomson & Co., Montreal, Canada. [12]E. B. Merritt & Co., Inc., Bridgeport, Conn. [13]Peters Trust Co., Omaha, Neb. [14]Second Ward Securities Co., Milwaukee, Wis. [15]Central Trust Co. of Illinois, Chicago. [16]J. S. Wilson Jr. Co., Baltimore, Md. [17]Chas. W. Scranton & Co., New Haven, Conn. [18]Dean, Witter & Co., Los Angeles, Calif. [19]Hemphill, Noyes & Co., New York. [20]Quotations by Bond & Goodwin & Tucker, Inc., San Francisco. [21]Baker, Simonds & Co., Inc., New York. [22]William C. Simons, Inc., Springfield, Mass. [23]Blair & Co., New York and Chicago. [24]A. B. Leach and Co., Inc., Chicago. [25]A. C. Richards & Co., Philadelphia, Penn. [26]Hincks Bros. & Co., Bridgeport, Conn. [27]J. G. White and Co., New York. [28]Mitchell-Hutchins Co., Chicago, Ill. [29]National City Co., Chicago, Ill. [30]Chicago Trust Co., Chicago. [31]McIntyre & Co., New York, N. Y. [32]Hepburn & Co., New York. [33]Boettcher & Co., Denver, Colo. [34]Kidder, Peabody & Co., Boston, Mass. [35]Farnum, Winter and Co., Chicago.

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS (Continued)

Stock	Date	Par	Price Bid	Price Asked	Dividend Rate
Riverside Portland Cement Co.	Apr. 11	.....	165	.....	
Rockland and Rockport Lime Corp. (1st preferred)[34]	Apr. 11	100	103	.....	3½% semi-annual Feb. 1
Rockland and Rockport Lime Corp. (2nd preferred)[34]	Apr. 11	100	60	.....	3% semi-annual Feb. 1
Rockland and Rockport Lime Corp. (common)[34]	Apr. 11	No par	50	55	1½% quar. Nov. 2
Sandusky Cement Co. (common)[3]	Mar. 30	100	125	135	$2 qu. April 1
Santa Cruz Portland Cement Co. (bonds)[8]	Apr. 9	.....	105	108	6% annual
Santa Cruz Portland Cement Co. (common)[8]	Apr. 9	.....	85	100	$1 quar., $1 ex. Jan. 1
Schumacher Wallboard Corp. (common)	Mar. 26	.....	27¼	27¾	
Schumacher Wallboard Corp. (preferred)	Mar. 26	.....	27¾	.....	
Southwestern Portland Cement Co. (units)	Apr. 11	.....	205	.....	
Superior Portland Cement, Inc. (Class A)[30]	Apr. 9	.....	43	44	
Superior Portland Cement, Inc. (Class B)[30]	Apr. 9	.....	21½	22	
United Fuel and Supply Co. (sand and gravel) 1st Mort. 6s[27]	Apr. 8	100	98	100	
United Fuel and Supply Co. (sand and gravel) 6% gold notes[27]	Apr. 8	100	98	100	
United States Gypsum Co. (common)	Apr. 11	20	102	102½	40c quar. March 31
United States Gypsum Co. (preferred)	Apr. 11	100	118	.....	1¾% quar. March 31
Universal Gypsum Co. (common)[3]	Apr. 11	No par	6½	7½	
Universal Gypsum V.T.C.[3]	Apr. 12	No par	6½	7	
Universal Gypsum Co. (preferred)[3]	Nov. 23	.....	73	77	1½% Feb. 15
Universal Gypsum and Lime Co. (1st 6's, 1946)[3]	Apr. 12	100	.....	96	
Union Rock Co. (7% serial gold bonds)[18]	Apr. 8	100	99	101	
Upper Hudson Stone Co. (1st 6's, 1951)[32]	Apr. 11	.....	93	.....	
Upper Hudson Stone Co. (1st 6's, 1937)[32]	Apr. 11	.....	93	.....	
Vulcanite Portland Cement Co. (7½% bonds, 1943)[32]	Apr. 11	.....	104	.....	
Wisconsin Lime and Cement Co. (1st Mort. 6s, 1940)[15]	Apr. 12	100	99	101	
Wolverine Portland Cement Co.	Apr. 11	10	5¼	6	1½% Feb. 15
Yosemite Portland Cement Co.	Apr. 11	.....	7¼	8½	

QUOTATIONS OF INACTIVE ROCK PRODUCTS SECURITIES

Stock	Date	Par	Price bid	Price asked	Dividend rate
Atlanta Shope Brick and Tile Co.[1]	Nov. 24	.....	25c	.....	
Benedict Stone Corp. (cast-stone) (50 sh. pfd. and 390 sh. com.)[1]	Dec. 29	.....	$400 for the lot	.....	
Blue Stone Quarry (60 shares)[2]	Mar. 16	.....	$10¼ for the lot	.....	
Coplay Cement Mfg. Co. (common) (4)	Dec. 16	.....	12½	.....	
Coplay Cement Mfg. Co. (preferred) (4)	Dec. 30	.....	70	.....	
Eastern Brick Corp. 7% cu. pfd.) (1)	Dec. 9	10	40c	.....	
Eastern Brick Corp. (sand lime brick) (common) (1)	Dec. 9	10	40c	.....	
Edison Portland Cement Co. (common)[4]	Sept. 11	50	20c	.....	
Edison Portland Cement Co. (preferred)	Nov. 3	50	17½c(x)	.....	
International Portland Cement Co., Ltd. (preferred)	Mar. 1	.....	30	45	
Globe Phospate Co. ($10,000 1st mtg. bonds, $169.80 per $1000 paid on prin.)	Dec. 22	.....	$50 for the lot	.....	
Iroquois Sand & Gravel Co., Ltd. (2 sh. com. and 3 sh. pfd.) (1)	Mar. 17	.....	$12 for the lot	.....	
Limestone Products Corp. (150 sh. pfd., $50 par, and 150 sh. com., no par)	Dec. 22	.....	$60 for the lot	.....	
Missouri Portland Cement Co. (serial bonds)	Dec. 31	.....	104¾	104¾	3¼% semi-annual
Olympic Portland Cement Co. (g)	Oct. 13	.....	.....	£1¾	
Phosphate Mining Co. (1)	Nov. 24	.....	1	.....	
River Feldspar and Milling Co. (50 sh. com. and 50 sh. pfd.) (1)	June 23	.....	$200 for the lot		
Rockport Granite Co. (1st 6's, 1934)[2]	Aug. 31	.....	90	.....	
Simbroco Stone Co. (pfd.)	Dec. 12	.....	.....	.....	$2 Jan. 1
Southern Phosphate Corp.[6]	Sept. 15	.....	1¼	.....	
Tidewater Portland Cement Co. (3000 sh. com.)	Dec. 22	.....	$6525 for the lot	.....	
Vermont Milling Products Co. (slate granules) 22 sh. com. and 12 sh. pfd. (5)	Nov. 3	.....	$1 for the lot	.....	
Wabash Portland Cement Co.[1]	Aug. 3	50	60	100	
Winchester Brick Co. (preferred) (sand lime brick) (4)	Dec. 16	.....	10c	.....	

(g) Neidecker and Co., Ltd., London, England. (1) Price obtained at auction by Adrian H. Muller & Sons, New York. (2) Price obtained at auction by R. L. Day and Co., Boston. (3) Price obtained at auction by Weilepp-Bruton and Co., Baltimore, Md. (4) Price obtained at auction by Barnes and Lofland, Philadelphia, Pa. (5) Price obtained at auction for lot of 50 shares by R. L. Day and Co., Boston, Mass. (x) Price obtained at auction by Barnes and Lofland, Philadelphia, on November 3, 1925. (6) Price obtained at auction by Wise, Hobbs and Arnold, Boston, Mass.

Trinity Portland Notes Offered

FIRST NATIONAL CO., Mississippi Valley Trust Co. and G. H. Walker and Co., St. Louis, Mo., are offering at 100 and interest $1,000,000 first mortgage collateral trust three-year 5½% gold notes.

Dated January 3, 1927, due January 1, 1930. Interest payable J. & J. Denominations $500 and $1000. Principal and interest payable at St. Louis Union Trust Co. in St. Louis. Not subject to call. City National Bank of Dallas, Texas, trustee.

The following data are taken from a letter of C. E. Ulkrickson, vice-president and general manager of the Trinity company:

Company. Organized in West Virginia with a permit to do business in Texas. At the present time it has in operation two plants; one located in Dallas county near the city of Dallas, Texas, and the other in Tarrant county near the city of Fort Worth, Texas. Both are situated directly upon large deposits of limestone, the Dallas tract containing 539 acres and the Fort Worth tract 602 acres. Each plant is a complete unit equipped with the most modern and efficient low-cost production machinery. Another plant is in course of construction in Harris county near the city of Houston, Texas. The combined annual productive capacity of the three plants will be 2,400,000 bbl. of cement, divided about as follows: Dallas, 1,200,000 bbl.; Fort Worth, 600,000 bbl.; Houston, 600,000 bbl. The character of construction of the Fort Worth and Houston plants is such that for a comparatively small additional expenditure their capacities can be doubled.

Purpose. Proceeds will be applied to the reduction of the present current debt, the completion of the Houston plant and to other corporate purposes.

Security. The company holds in its treasury a closed issue of $1,000,000 10-year 8% bonds due in 1934, secured in the opinion of counsel by a first mortgage to the St. Louis Union Trust Co., covering the Dallas and Fort Worth plants, machinery, equipment, etc., and the raw material referred to above. This issue of three-year collateral trust notes, which will be a direct obligation of the company and its only funded debt, will be secured by a valid pledge of the entire issue of the 10-year mortgage bonds described above, which will be lodged with the City National Bank of Dallas, Texas. The Houston plant will not be covered by the mortgage.

Earnings. The company's operations have shown a profit for the past eight years. For the four years ended December 31 the net earnings have been as follows:

	Net before Depr. & Depl.	Deprec. & Depl.	Appl. to Int. & Fed. Taxes
1923	$757,810	$163,596	$594,214
1924	713,732	145,923	567,804
1925	801,682	162,276	639,406
1926	915,558	182,998	732,560

Capitalization. The capitalization after this issue is as follows:

Capitalization	Authorized	Issued
First mortgage and collateral trust notes	.....	$1,000,000
7% preferred stock (par $100)	$1,750,000	1,750,000
Common stock (par $100)	1,750,000	1,750,000

TRINITY PORTLAND CEMENT CO.
BALANCE SHEET
(As of December 31, 1926)

The following is a copy of the company's balance sheet as of December 31, 1926, prepared by Messrs. Schoolar, Bird & Co. and adjusted by them to reflect this financing:

ASSETS

Current and Working Assets:		
Cash on hand and in banks		$669,342.70
Notes and accounts receivable	$582,666.87	
Stocks and bonds	45,450.00	
	$628,116.87	
Less: Reserve for contingencies	50,000.00	578,116.87
Inventories — Mdse., supplies, raw and finished materials (at cost or market, whichever lower)		569,519.87
Total current assets		$1,816,979.44
Deferred Charges:		
Prepayments and advances—Insurance, interest, etc.		39,446.81
Total current and working assets		$1,856,426.25
Fixed Assets:		
Property Account:		
Good-will		$1,750,000.00
Real estate, buildings, mch'y, equip., etc.	$4,777,809.93	
Less: Reserve for depreciation, obsolescence and depletion	1,299,996.15	3,477,813.78
		$5,227,813.78

Other Equipment:		
Automobiles and trucks, less depreciation	$40,029.04	
Furniture and fixtures, less depreciation	21,703.68	61,732.72
Total fixed assets		$5,289,546.50
Total assets		$7,145,972.75

LIABILITIES AND NET WORTH

Liabilities:		
Notes payable		$60,768.00
Accounts payable		28,903.16
Accrued taxes, commissions, interest, etc.		126,768.75
Current liabilities		$216,439.91
Funded Debt:		
Collateral trust three-year 5½% notes—Due January 1, 1930 (this issue)		1,000,000.00
(Bonded debt: Authorized and issued first mortgage bonds, $1,000,000.00; outstanding, none).		
Notes payable—Due February 1, 1930—subordinated to this issue		325,000.00
Total liabilities		$1,541,439.91
Net Worth:		
Capital Stock Authorized and Issued:		
Preferred—17,500 shares of $100.00 par value each		$1,750,000.00
Common—17,500 shares of $100.00 par value each		1,750,000.00
Total capital stock		$3,500,000.00
Surplus		2,104,532.84
Total net worth		5,604,532.84
Total liabilities and net worth		$7,145,972.75

International Cement Annual Report

THE following is the eighth annual report of the International Cement Corp., New York, presented to the stockholders by H. Struckmann, president:

Net consolidated income for the year, after all charges including liberal depreciation, depletion reserves and federal income taxes, amounted to $4,355,199, as compared with $3,976,385 for the year 1925. Allowing for preferred dividends paid, this net income is equivalent to approximately $6.52 per share on the 562,500 shares of common stock outstanding at the close of the year, as compared with $7.03 per share on the 500,000 shares outstanding at the close of the previous year.

During the year, the directors authorized the issuance of 62,500 shares of common stock which were offered to common stockholders at a price of $50 per share on the basis of one share of common for each eight shares held. All the stock so offered was taken. Funds derived from this issue were used to assist in financing construction of the Louisiana plant and other improvements and enlargements. Proceeds from the sale of this stock and the 1926 earnings are accounted for in the following summary of income and disposition:

Income:	
Net income from operations	$4,355,199.42
Increase in depreciation and depletion reserve for which there was no cash expenditure	1,538,260.69
From sale of 62,500 shares of common stock@$50	3,125,000.00
	$9,018,460.11
Disposition:	
Dividends paid	$2,812,524.00
Invested in capital assets including construction of Louisiana plant	4,147,799.71
Net current assets increaed	1,716,896.55
Preferred stock sinking fund purchase, surplus adjustments, etc.	341,239.85
	$9,018,460.11

With the completion of the Louisiana plant and other enlargements, the International system comprises 11 mills with a total capacity of 14,700,000 bbl. per year, an increase of 2,700,000 bbl. over the previous year. All of these mills are strategically located both as to abundant supplies of raw material as well as desirable markets in eight different consuming centers of the United States and also in Cuba, Argentine and Uruguay.

The construction of the plant at New Orleans has been pushed with all possible speed, and it is now expected that manufacturing operations at this plant will be started in May of this year. The original plans contemplated the use of oyster shells at New Orleans for the lime constituent necessary to produce a high grade portland cement, but during the construction period we were offered a very large deposit of high grade chalk located on the Tombigbee river and because of the lower cost involved in grinding this material, as compared with oyster shells, we purchased the entire tract. This property furnishes us an unlimited quantity of raw material not only for the New Orleans plant but also for other locations on the gulf coast which may later be considered, and will through the admixture of pure shells from our shell deposits enable us to manufacture a product superior to any present known standard portland cement.

The plant of the Virginia company began operation late in 1925, and its product was first offered on the market in January, 1926. The results fulfilled in every particular the expectations of the management. All of the other domestic plants were operated at full capacity, with the exception of the Indiana property, which suffered from unsatisfactory trade conditions prevailing in the territory which it serves.

New Quick Hardening Cement Developed

During the time the Indiana plant was partly shut down, our chemists and engineers succeeded in developing a special cement which has shown remarkable early strength qualities, attaining in 24 hours the strength ordinarily acquired in 28 days by standard portland cement. Application has been filed for patents covering the process under which this special cement is manufactured and we believe this development will be of the greatest importance to your company considering the steadily increasing demand for a quick hardening cement which has been created during the last few years.

The foreign plants enjoyed a very prosperous year during which they operated to full capacity and conditions in the territories they serve appear to be very favorable. During the year the Cuban company entered into a contract with the Cuban government to supply its entire cement requirements for use in public works during the next four years, the estimated tonnage involved in this contract being 2,000,000 bbl.

Capital expenditures during the year included several large items as follows: Construction of New Orleans plant; equipment

COMPARATIVE CONSOLIDATED INCOME ACCOUNT, INTERNATIONAL CEMENT CORP. AND SUBSIDIARY COMPANIES

(For the Years Ended December 31, 1926, and December 31, 1925)

	1926	1925	Increase
Sales, less discts., allowances, etc.	$21,623,581.54	$17,713,900.26	$3,909,681.28
Cost of sales:			
Manufacturing & shipping cost	$12,253,367.94	$10,021,390.23	$2,231,977.71
Provision for dprn. and dpln.	1,724,151.11	1,154,627.23	569,523.88
Total cost of sales	$13,977,519.05	$11,176,017.46	$2,801,501.59
Manufacturing profit	$7,646,062.49	$6,537,882.80	$1,108,179.69
Selling, admin. & gen. expense	2,618,452.18	2,064,055.49	554,396.69
Net profit from operations	$5,027,610,31	$4,473,827.31	$553,783.00
Miscellaneous income	208,609.56	164,994.14	43,615.42
Total income	$5,236,219.87	$4,638,821.45	$597,398.42
Provision for income taxes and misc. charges, incl. deductions incident to computing profits of So. Amer. subsidiaries at rates of exchange prevailing Dec. 31, 1926	881,020.45	662,436.24	218,584.21
Net income for year carried to surplus account	$4,355,199.42	$3,976,385.21	$378,814.21

CONSOLIDATED SURPLUS ACCOUNT

Balance at December 31, 1925		$6,403,398.94
Add:		
Net income for the year ending Dec. 31, 1926		4,355,199.42
		$10,758,598.36
Deduct:		
Surplus of subsidiary companies in Argentine and Uruguay set aside in accordance with the laws thereof	$26,429.16	
Income taxes and other adjustments in prior years	69,398.42	
Increase in reserve for exchange on net current assets in South America	9,875.44	105,703.02
Balance		$10,652,895.34
Deduct—Dividends paid:		
International Cement Corp.:		
Preferred stock	$685,758.50	
Common stock	2,125,000.00	
	$2,810,758.50	
Subsidiary companies:		
On capital stock not owned	1,765.50	2,812,524.00
Surplus—Carried to balance sheet		$7,840,371.34

ANNUAL REPORT INTERNATIONAL CEMENT CORP., 1919-1926 (INCLUSIVE)

	1926	1925	1924	1923	1922	1921	1920	1919
Productive capacity, barrels	14,700,000	12,000,000	7,000,000	5,400,000	4,450,000	4,450,000	3,200,000	2,800,000
Sales	$21,623,582	$17,713,900	$13,683,503	$11,289,117	$9,407,725	$9,172,311	$8,461,896	$4,492,624
Total income	5,236,220	4,638,821	3,771,397	2,972,430	1,862,080	2,271,127	2,564,009	743,039
Interest, taxes, etc.	881,020	662,436	723,890	549,853	437,033	741,226	784,450	425,435
Net income	4,355,199	3,976,385	3,047,507	2,422,577	1,425,047	1,529,901	1,779,559	317,604
Balance for common	3,669,441	3,518,462	2,853,917	2,319,225	1,318,031	1,475,374	1,779,559	317,604
Earnings per share common	$6.52	$7.03	$7.14	$6.37	$4.06	$4.55	$6.62	$1.33
Capitalization—								
Funded debt and notes				$345,900	$1,627,758	$1,840.801	$2,636,938	$3,649,524
Preferred 7% cumulative	$9,694,400	$9,971,700	$3,411,800	1,468,700	1,490,700	1,558,000		
Number of shares common	562,500	500,000	400,000	364,167	324,047	323,978	268,139	238,686

for large increase in additional capacity at the three foreign plants; improvements at the Indiana and Knickerbocker mills.

The encouraging outlook for your foreign companies has influenced the directors to approve appropriations for equipment necessary to further increase the capacity of each of the foreign plants. Appropriations have also been approved for changing the Alabama property from a dry to a wet process plant, at the same time lengthening its kilns, thus increasing the efficiency of the plant and always assuring the highest quality of its product.

During the past year there has been a considerable increase in cement importations reaching the United States, particularly from Belgium. This condition is made possible by the low wage scale prevailing in Europe, together with low freight rates and the absence of a protective tariff on cement shipped into the United States from abroad. In endeavoring to protect its interests and to enable our dealers to compete with the importers of foreign cement, your company has found it necessary to adjust its prices in certain of its coastal territories. The result of this adjustment, which, to some extent, has also affected plants located in the interior, has been that shipments for the first two months of 1927 have shown a considerable increase over shipments for the same period last year, and owing to the excellent geographical location of all of your company's plant they are in an advantageous position to serve their respective territories to the best possible advantage, confirming our confidence that we will be able to market our output during 1927 at a satisfactory profit.

The financial position of your company as reflected by the attached balance sheet shows decided gains, strong in quick asset position and free from all mortgage indebtedness.

History and Development

The following from a recent bulletin issued by the International Cement Corp. will better illustrate the growth of the company since its organization:

The development of the International Cement Corp. to its present position as one of the world's large cement producers has proceeded in accordance with a definite basic plan, which may be summarized as follows:

1. To so distribute its cement-producing properties that its earnings would remain unaffected by seasoned trends in cement consumption.

2. To safeguard against business depression in any one locality, as well as to protect itself against competitive conditions arising from localized overproduction.

3. To locate its mill adjacent to large and growing consuming markets and where access is afforded to transportation facilities which make it possible economically to serve a wide area.

Growth of System

When it was incorporated in 1919 the International system included five mills—two in Texas and one each in Cuba, Argentine and Uruguay—with a combined annual capacity of 2,900,000 bbl. In accordance with the foregoing basic plan, the number of its mills has been increased to 11, with a present annual capacity of 14,700,000 bbl. of cement.

The Knickerbocker mill at Hudson, N. Y., was added to the system in 1921. In 1923 the mill at Bonner Springs, Kan., was purchased.

The property at Norfolk was acquired in 1924. In 1925 the Indiana Portland Cement Co. became an International subsidiary. In the same year the Birmingham plant was purchased and with it was acquired the site in New Orleans on which the 11th mill of the International system has been erected.

It will be noted that with the exception of the New Orleans plant, the development of the International system has been effected almost entirely through the acquisition and improvement of existing mills, rather than by adding new production to the territories served by the International Cement Corp.

Increase of 400% in Capacity With 300% Increase in Capital

Since its organization in 1919, the total capacity of the International system has been increased 400%. During that time the corporation's total capitalization has increased 300%. The productive capacity of the mills of the International system is carried at a net valuation of approximately $2.30 per bbl.

Two charts to show the proportion of earnings paid to stockholders and the proportion of earnings left in or reinvested in the business are shown herewith.

It will be noted that from 1919, when this corporation was organized, up to and including 1926, a provision of $7,449,478 for depreciation and depletion was set aside out of earnings. These funds were not expended but were reinvested in the business. From 1919, to and including 1926, a total of $8,756,807, which is 46.45% of the remaining net earnings, was also reinvested in the business.

This accumulated surplus was used in redeeming the corporation's funded debt (of which there is none now outstanding), for additions and betterments, for working capital and for sinking fund to retire its preferred stock.

The chart shows that up to December 31, 1926, the earnings returned to the property amounted to $15.56 for each share of common stock. In the same period the dividends paid on the common stock amount to a total of $15.10 a share. These figures are on a basis of present outstanding common stock of 562,500 shares.

Operating Policy

A fundamental part of the operating policy of the International system is to build a strong local management in each of its subsidiary companies, and to have each subsidiary take its place as an integral part of the territory it serves. Instead of being a local "branch" of a remote directing management, each International mill stands upon its own feet, and its operating heads are

INTERNATIONAL CEMENT CORP. COMPARATIVE CONSOLIDATED BALANCE SHEET

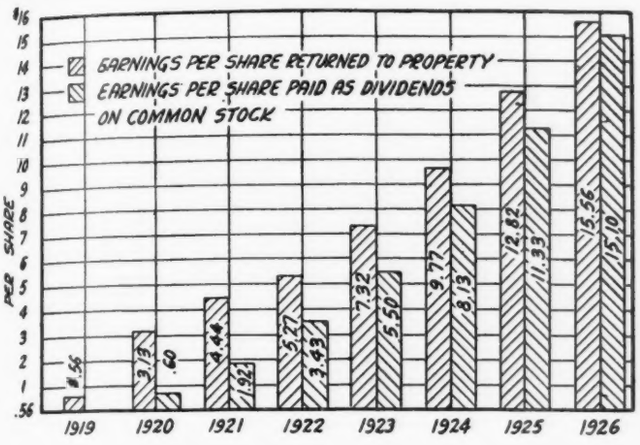
ASSETS

	1926	1925	Increase
Current assets:			
Cash in banks and on hand	$1,190,345.87	$547,121.09	$643,224.78
Marketable securities & accrued interest thereon	24,237.00	41,377.58	*17,140.58
Accounts and notes receivable:			
Customers' accounts	1,656,146.57	1,332,989.04	323,157.53
Miscellaneous accounts	214,419.02	128,592.46	85,826.56
Notes rec. and accrued int.	278,731.86	230,609.17	48,122.69
	$2,149,297.45	$1,692,190.67	$457,106.78
Less—Reserve for doubtful items	132,285.87	126,537.64	5,748.23
	$2,017,011.58	$1,565,653.03	$451,358.55
Inventories at cost or market, whichever is lower:			
Finished cement and process stocks	1,427,353.18	1,233,183.35	194,169.83
Packages, fuel and general supplies	2,782,208.26	2,566,111.72	216,096.54
	$4,209,561.44	$3,799,295.07	$410,266.37
	$7,441,155.89	$5,953,446.77	$1,487,709.12
Less—Reserve for loss on exchange on net current assets in South America	46,154.34	21,967.31	24,187.03
	$7,395,001.55	$5,931,479.46	$1,463,522.09
Deferred charges	$333,935.87	$363,201.83	*$29,265.96
Capital assets:			
Plant sites, mineral lands, rights, buildings, machinery, equipment, tools and furniture and fixtures, etc.	$39,051,212.29	$34,903,412.58	$4,147,799.71
Less—Reserve for depreciation and depletion	8,339,029.36	6,800,768.67	1,538,260.69
	$30,712,182.93	$28,102,643.91	$2,609,539.02
	$38,441,120.35	$34,397,325.20	$4,043,795.15

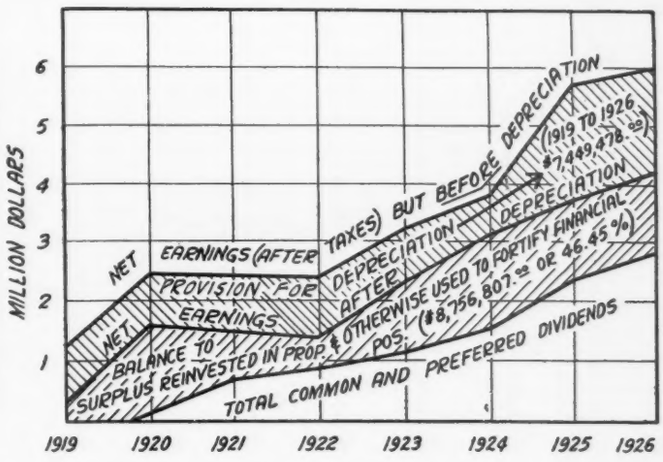
LIABILITIES

	1926	1925	Increase
Current liabilities:			
Accounts payable	$1,033,530.12	$1,398,854.26	*$365,324.14
Accrued taxes and expenses	216,948.68	180,794.34	36,154.34
Provision for income taxes	568,320.05	492,524.71	75,795.34
	$1,818,798.85	$2,072,173.31	*$253,374.46
Employes' subscriptions to capital stock	$229,065.38	$56,001.32	$173,064.06
Reserves:			
Surplus of subsidiary companies in Argentine and Uruguay set aside in accordance with laws thereof	$99,393.52	$72,964.37	$26,429.15
Capital stock of subsidiary companies not owned	$165,397.08	$215,797.08	*$50,400.00
Capital and surplus:			
7% cumulative preferred stock:			
Authorized 150,000 shares par $100, $15,000,000.00; issued 103,080 shares	$10,308,000.00	$10,308,000.00	.....
Less—Retired through sinking fund and purchased for retirement 6,136 shares	613,600.00	336,300.00	$277,300.00
	$9,694,400.00	$9,971,700.00	*$277,300.00
Common stock:			
Authorized 600,000 shares no par value; issued and outstanding, 562,500 shares	18,593,694.18	15,605,290.18	2,988,404.00
Earned surplus	7,840,371.34	6,403,398.94	1,436,972.40
	$36,128,465.52	$31,980,389.12	$4,148,076.40
	$38,441,120.35	$34,397,325.20	$4,043,795.15

*Decrease.



Comparison of earnings returned to property with amount paid in dividends on common stock (cumulative, 1919-1926), figured on basis of 562,500 shares of common



Showing provision made for depreciation and earnings returned to property 1919-1926 (International Cement Corporation)

able to carefully attune its service to the needs of its territory.

At the same time, the supporting strength of the International Cement Corp. makes available to each local subsidiary experienced commercial counsel, as well as technical and engineering skill which no one mill could of itself afford.

The standards of quality set by the International Cement Corp. are steadfastly adhered to by each subsidiary. By means of the International wet-blending process each mill is able to produce cement that not only exceeds standard specifications by a wide margin, but successfully maintains that quality day in and day out.

In distributing "Lone Star" cement to the user, the International Cement Corp. has elected to sell its output through the building material dealer, because experience has shown that this method of distribution is most advantageous both to the manufacturer and those who consume the product. Adherence to this policy at all times has earned for the company the good will of building material dealers.

North American Cement 1926 Report

NORTH AMERICAN CEMENT CORP. reports for year ended December 31, 1926, net sales of $6,095,887 compared with $6,154,583 in 1925. After expenses, depreciation, depletion, etc., net earnings available for interest and federal taxes were $1,082,912 against $1,552,724 before interest and federal taxes in previous year.

Balance sheet of North American Cement Corp. as of December 31, 1926, follows:

Assets: Real estate, buildings, equipment and stone deposits, less depreciation and depletion, $14,101,312; stock for employes, $60,891; cash, $235,592; accounts and notes receivable, $415,523; inventory, $1,100,330; deferred charges, $830,798; total, $16,744,446.

Liabilities: Preferred stock, $5,150,000; common stock (represented by 133,250 no-par shares), $1,412,500; bonds, $7,732,000; accounts payable, $272,013; accrued interest, federal tax reserve, etc., $271,370; reserve for insurance and accidents, $50,659; initial and earned surplus, $1,855,904; total, $16,744,446.—*Wall Street Journal.*

Missouri Portland Distributes Stock at Half of Market Value

THE directors of the Missouri Portland Cement Co. at a recent special meeting authorized the sale of 60,000 shares of treasury stock to present share owners at the par of $25 a share, on the basis of one share of the new issue for each four held already. The closing price on the St. Louis Stock Exchange on April 13 was $49. At that rate the new stock is worth almost double what it will cost to acquire.

There are 240,000 shares now outstanding worth $6,000,000 at par and nearly $12,000,000 at the present market price. The proceeds of the new stock sale, $1,500,000, will be used for building a plant for the manufacture of quick hardening cement. Further details will be announced within a short time, the report states.—*St. Louis* (Mo.) *Post Dispatch.*

Peace Prevails in the Construction Industry

GENERALLY speaking, the labor outlook this spring is much better than at this time last year. A year ago there was considerable uncertainty as to what the trades would demand, and in a number of cities strikes were called on March 1 to force increases in wage rates. The outstanding event of the past month was the speedy termination of the iron workers' strike in Pittsburgh, details of which are given in another place in this Bulletin. Taking the country as a whole, there will be but few wage increases and a minimum of strikes. The five-day week issue apparently is not going to be pressed this year, largely on account of the fact that the employers and the public are united in the belief that there is no justification in decreasing the number of hours now being worked by men in the building trades. Practically every city reports a surplus of labor in all of the crafts, and with less demand for building this year than there was last it is apparent that there will be some idle labor throughout the country all year. Taking all of these points into consideration, it appears at this time that the industry will be entirely free from any serious tie-ups this year and that labor will be willing to go along under wage rates and conditions in effect in 1926.—*National Bulletin* of the Association of Building Trades Employers.

British Rock Products Industry in 1925

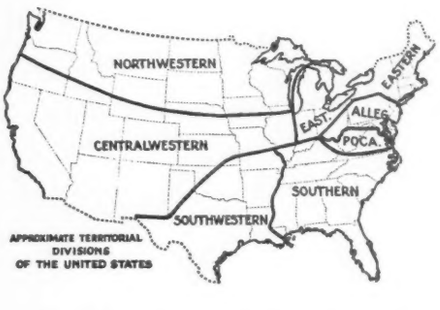
THE production of rock products in the United Kingdom during 1925 showed an increase in nearly all materials falling under this classification, according to the annual report of the British Mines Department. The total amount of all limestone produced for various purposes, such as lime and cement making, roadstone, flux, etc., was 13,060,753 tons as compared with 12,813,471 tons in 1924. The decreased production of limestone and dolomite for fluxing purposes and ganister and silica rock for refractories indicates the depressed iron and steel industry of the country.

The following table gives comparative production in tons of other rock products in 1925 and 1924:

Material	1925	1924
Gypsum	414,302	371,289
Barytes and witherite	48,671	54,767
Feldspar	.....	1,053
Felsite	36,127	35,908
Calcite	12,807	9,306
Fluorspar	39,079	49,492
Ganister (including rock silica, silica stone and silica sand for refractories)	494,293	634,431
Foundry sands	679,559	648,840
Limestone	13,060,753	12,813,471
Chalk	5,035,350	4,402,560
Sandstone	2,888,741	2,531,917
Slate	305,763	287,705
Chert, flint, etc.	134,688	148,279
Sand and gravel	3,741,961	2,922,485
Igneous rocks	8,185,856	7,432,696

Traffic and Transportation

EDWIN BROOKER, Consulting Transportation and Traffic Expert
Munsey Building, Washington, D. C.



Car Loadings of Sand and Gravel, Stone and Limestone Flux

THE following are the weekly car loadings of sand and gravel, crushed stone and limestone flux (by railroad districts), as reported by the Car Service Division, American Railway Association, Washington, D. C.:

CAR LOADINGS OF SAND, GRAVEL, STONE AND LIMESTONE FLUX

District	Limestone Flux Week ended Mar. 12	Limestone Flux Week ended Mar. 19	Sand, Stone and Gravel Week ended Mar. 12	Sand, Stone and Gravel Week ended Mar. 19
Eastern	2,337	2,403	2,785	3,206
Allegheny	3,285	3,131	3,635	4,789
Pocahontas	223	355	328	370
Southern	476	535	9,920	10,028
Northwestern	1,014	1,271	3,140	3,400
Central Western	427	392	6,266	6,950
Southwestern	337	340	4,657	4,981
Total	8,099	8,427	30,731	33,724

The following are the comparative total loadings of sand and gravel, crushed stone and limestone flux (by railroad districts) for like periods in 1926 and 1927:

COMPARATIVE TOTAL LOADINGS, BY DISTRICTS, 1926 AND 1927

District	Limestone Flux 1926 Period to date Mar. 20	Limestone Flux 1927 Period to date Mar. 19	Sand, Gravel and Stone 1926 Period to date Mar. 20	Sand, Gravel and Stone 1927 Period to date Mar. 19
Eastern	28,632	26,031	21,529	21,571
Allegheny	37,429	37,266	23,359	31,607
Pocahontas	2,908	2,011	4,209	4,104
Southern	7,001	5,627	93,607	113,566
Northwestern	10,478	10,369	20,661	26,714
Central Western	5,289	4,774	67,216	60,717
Southwestern	1,927	3,184	38,726	46,637
Total	93,664	89,262	269,307	304,916

COMPARATIVE TOTAL LOADINGS, 1926 AND 1927

	1926	1927
Limestone flux	*93,664*	*89,262*
Sand, stone and gravel	*269,307*	*304,916*

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning April 10:

SOUTHERN FREIGHT ASSOCIATION DOCKET

32755. **Limestone,** from Ashford, N. C., to Elk Mountain, New Bridge and Woodfin, N. C. Lowest combination now applies. Proposed rate on limestone, ground or pulverized, carloads, minimum weight 30 net tons, from and to points mentioned, 135c per net ton, made on basis of the carriers' proposed Georgia scale.

32786. **Marble, rubble, crushed or broken,** from Gantt's Quarry, Ala., to Gulf ports. It is proposed to establish rates on stone, marble, rubble, crushed or broken, carloads, minimum weight 90% of marked capacity of car, except that when cars are loaded to their visible capacity, actual weight will govern, from Gantt's Quarry, Ala., to New Orleans, La., Mobile, Ala., and Pensacola, Fla., the same as now apply on stone, rubble, crushed or broken, carloads.

32818. **Sand and gravel,** from Paducah, Ky., to B. & N. W. Ry. local stations. Present rate, 191c per net ton. Proposed rate on—Sand and gravel, straight carloads, minimum weight 90% of marked capacity of car—from Paducah, Ky., to Birmingham & North Western Ry. local stations, 135c per net ton, same as rate recently approved from Memphis, Tenn., to the same destinations. (Submittal 31829.)

32821. **Limestone,** from Lime Rock, Fla., to Thomasville, Ga. Present rate, 168c per net ton. (River Junction, Fla., combination.) Proposed rate on—Limestone, crushed, carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to their visible capacity, actual weight shall govern—from Lime Rock, Fla., to Thomasville, Ga., 126c per net ton, proposed in order to permit shippers at Lime Rock to meet competition at Montgomery, Ala.

32822. **Lime,** from southern lime kilns to Mt. Vernon, Ind. St. Louis, Mo., rates now apply to this point, and it is proposed to establish rates on lime, carloads, usual description, carloads, minimum weight 30,000 lb., from Alabama Group, viz.: Calera, Graystone, Keystone, Land Mark, Long View, Newala, Pelham, Roberta, Saginaw, Varnons, Wilmay, Ala.; Adams-Burns Group, viz.: Adams, Burns, Erin, Hematite, Lime Works, Palmyra, Rauscher, Willock, Tenn.; Knoxville, Tenn., Group, viz.: Concord, Knoxville, River Front Extension, South Knoxville Extension, Marble City, Luttrell, Tenn., Kentucky Group, viz.: Mt. Vernon and Pine Hill, Ky.—to Mt. Vernon, Ind., made 40c per net ton over the rate to Evansville, Ind.

32829. **Sand and gravel,** from Montgomery, Jackson's Lake, Prattville Junction, Oktamulke and Coosada, Ala., to Graces, Ala. It is proposed to establish reduced rate of 79c per net ton (intrastate) on sand and gravel, carloads, minimum weight 90% of marked capacity of car, except that when cars are loaded to their visible capacity actual weight will govern, from the origins mentioned above to Graces, Ala., same as current rate from these points to Birmingham, Ala.

32859. **Sand and gravel,** Paducah, Ky., to B. & N. W. R. R. local stations. Present rate, 191c per net ton. Proposed rate on sand and gravel, straight carloads, minimum weight 90% of capacity of car, from Paducah, Ky., to B. & N. W. R. R. local stations, 135c per net ton, same as rate recently approved from Memphis, Tenn., to these destinations.

33047. **Stone,** crushed, from Whitestone, Ga., to Orangeburg, S. C. Present rate, 279c per net ton. (Atlanta combination.) Proposed rate on—Stone, crushed, carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to their visible capacity, actual weight will govern—from Whitestone, Ga., to Orangeburg, S. C., 239c per net ton, made in line with rates in effect to destinations in the vicinity of Orangeburg.

33115. **Marble, granite or stone, crushed,** from New York, N. Y., and Cardiff, Md., to Whitestone, Ga. Class "A" rates now apply. Proposed rates on—Marble, granite and stone, crushed, carloads, minimum weight 40,000 lb., to Whitestone, Ga.: From New York, N. Y., 37½c; from Cardiff, Md., 40½c per 100 lb., same as rates in effect to Atlanta, Ga., and Cartersville, Ga.

33120. **Stone, crushed,** etc., from Conyers, Lithonia, Redan and Stone Mountain, Ga., to Gulfport, Miss. The present rate, which is the result of error, is 225c per net ton. Proposed rate on—Stone, viz., crushed, rubble or granite sand, carloads, minimum weight 60,000 lb., from the origins mentioned to Gulfport, Miss., 250c per net ton, same as in effect prior to January 10, 1925, and is the same as in effect to New Orleans, La., and other points to which the rates are made the same as to New Orleans, La.

33130. **Whitestone,** ground or pulverized, from Jacksonville, Fla. (from beyond) to interior Florida points. Class rates now apply. It is proposed to publish specific rates on—Whitestone, ground or pulverized, carloads, minimum weight 60,000 lb.—from Jacksonville (from beyond) Fla., to interior Florida points, the same as now in effect on limestone, ground or pulverized, carloads, minimum weight 60,000 lb.

33145. **Granite or stone, crushed** or rubble, from Columbia, S. C., to Meggetts, Carlton, Simons-Mayrant Siding, Wideawake and Yenges, S. C., via S. A. L. Ry. direct. The present intrastate rate of 124c per net ton on—Granite or stone, crushed or rubble, carloads, minimum weight 60,000 lb., but not in excess of the marked capacity of car, from Columbia, S. C., to Meggetts, S. C., via the S. A. L. Ry. was made the same as the rate applicable via the A. C. L. R. R., with the other points mentioned, same as Meggetts. The rate via the A. C. L. has been advanced to 140c per net ton, and it is proposed to correspondingly increase the rate applicable via the S. A. L. Ry.

33176. **Limestone,** from Whitestone, Ga., to Madisonville, Ky. Present rate, 710c per net ton (Class "N"). Proposed rate on limestone, ground or pulverized, in barrels, bags or in bulk, carloads, minimum weight capacity of car, from Whitestone, Ga., to Madisonville, Ky., 300c per net ton, same as rate in effect from Kinsey and Old Murphy, N. C., to Evansville, Ind.

33177. **Marble,** crushed, etc., from Tate, Ga., and stone, crushed, etc., from Whitestone, Ga., to Wrights, N. J. (via Cincinnati, Ohio). It is proposed to establish reduced rate of 654c per net ton on marble, crushed, ground or pulverized, carloads, minimum weight 60,000 lb., from Tate, Ga., and on stone, crushed and powdered whitestone, carloads, minimum weight 60,000 lb., from Whitestone, Ga., to Wrights, N. J., for application via L. & N. R. R., Cincinnati, Ohio, and connections, same as rate in effect via this route to New York, N. Y.

33179. **Stone, broken or crushed,** from Russellville, Ky., to Elkton, Ky. Present rate 162c per net ton. Proposed rate on stone, broken or crushed, carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to their visible capacity actual weight shall govern, from Russellville, Ky., to Elkton, Ky., 113c per net ton. Proposed in order to meet competition of local stone.

11799. **Sand,** from Mulvane, Kan., to points in Oklahoma. To establish rate of 4c per 100 lb. to Blackwell, Okla., and 3½c per 100 lb. to Kildare, Okla., on sand, carloads, minimum weight marked capacity of car, except when shipments loaded in open cars and loaded to full visible space capacity actual weight will govern, from Mulvane, Kan. It is stated that the Mulvane, Kan., shippers are at a great disadvantage and in order to enable them to compete with the Kaw shippers it is necessary that the rate from Mulvane, Kan., be reduced to the figures shown above.

32948. **Sand and gravel,** from Montgomery, Ala., to Samson, Ala. Present rates: Gravel 7c per 100 lb.; sand, $20 per car of 30,000 lb., excess in proportion. Proposed rate (intrastate) on—

Sand and gravel, straight or mixed carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to their visible capacity actual weight will govern, from Montgomery to Samson, Ala., 122c per net ton, made more in line with rates to other southern points, such as Geneva, River Falls, Opp and Greenville, Ala.

32950. **Sand,** from Western Junction, Ala., to Alabama destinations. Combination basis now applies, and it is proposed to establish the following through rates on—

Sand, carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to their full visible capacity actual weight will govern, from Western Junction, Ala.:

To Alabama City, Ala., 108; Anniston, Ala., 96; Gadsden, Ala., 108; Sylacauga, Ala., 85; Talladega, Ala., 96c per net ton, based 6c per ton higher than rate from Montgomery, Ala.

To Attalla, Ala., 108c per net ton, same as proposed to Alabama City, Ala.

To Decatur, Ala., 145; Dothan, Ala., 140; Huntsville, Ala., 150; Ozark, Ala., 135; Mobile, Ala., 140; Troy, Ala., 115c per net ton, same

as scale prescribed by the Interstate Commerce Commission in Docket 17517.

To Oxford, Ala., 96c per net ton, same as proposed to Anniston, Ala.

32980. **Sand and gravel,** from Owensboro, Ky., to Elkton, Ky. Present rate, 220c per net ton; proposed rate on sand and gravel, straight carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to their visible capacity actual weight shall govern, from Owensboro, Ky., to Elkton, Ky., 150c per net ton, such rate to apply as maximum at intermediate points on intrastate traffic. Proposed rate made with relation to rate from Louisville, Ky., to Elkton, Ky.

33308. **Lime** from Southern Ry. stations in Virginia to Terra Cotta, Uniontown and Washington, D. C., and B. & O. R. R. stations. It is proposed to establish a rate of 190c per net ton on lime, carloads, minimum weight 30,000 lb., from Linville, Riverton, Toms Brook and Zirkle, Va., to stations on B. & O. R. R. (Metropolitan Branch), University to Georgetown, D. C., inclusive—same a rates proposed herein to Washington, D. C. (reduction). It is also proposed to publish rate of 190c per net ton from Riverton, Fishers Hill, Linville, Zirkle, Toms Brook and Strasburg, Va., group to Washington, D. C., Uniontown, D. C., Terra Cotta, D. C., Baltimore, Md., and Washington, D. C., in lieu of present rate of 189c per net ton. Proposed rate is the same as in effect from B. & O. R. R. kilns in the Strasburg district. The suggested rate to also apply to stations on Pa. R. R. between Baltimore and Washington.

CENTRAL FREIGHT ASSOCIATION DOCKET

15316. To establish rate of 125c per net ton on **crushed stone**, carloads, Sandusky, Ohio, to Zanesville, Ohio. Present rate, 140c per net ton.

15318. To establish on **gravel and sand,** except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam molding or silica carloads, Burr Oak, Ind., to points in Indiana, following rates per ton:

Destination—	Prop. Rate	Destination—	Prop. Rate
Dyer	95	Otis	95
Hartsdale	90	Wanatah	85
Elkhart	110	Wilders	85
North Manchester	100	Kokomo	85
Wabash	100	LaPorte	75
Warsaw	90	Marion	100
Hanna	75	Michigan City	80
Kendallville	110	Peru	75
Logansport	80	Plymouth	60
Monticello	90	Rochester	65
Portland	115	Stillwell	70
North Judson	80	Bremen	105
South Bend	90		

15344. To establish rate of 300c per net ton on **stone**, waste, chip rip rap, grout and spauls, carloads, Bloomington-Bedford district to Old Hickory, Tenn. Present rate, combination basis.

15386. To establish on **sand,** viz.: Blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica, carloads, Torpedo, Penn. Following rates (in cents per net ton):

To—	Prop.	Pres.
Kane, Penn.	126	151
James City, Penn.	126	*
Sergeant, Penn.	126	151
Wilcox, Penn.	126	151

*No through rate.

Present rates as named published in N. Y. C. R. R. L. S. No. 1354.

15387. To establish rate of 100c per net ton on **crushed limestone** screenings, carloads, Carey, Ohio, to Newark, Ohio. Present rate—Sixth Class.

15388. To establish on **sand and gravel,** carloads, rate of 60c per net ton, Massillon, Ohio, to Akron, Ohio. Present rate—70c per ton of 2000 lb.

15389. To establish on **gravel and sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica), carloads, Anderson, Ind. (rates in cents per net ton):

To C. I. & W. Ry. stations in Indiana:

	Prop.		Prop.
Irvington	100	Mauzy	90
Julietta	100	Glenwood	90
New Palestine	100	Longwood	90
Reedville	90	Connersville	90
Fountaintown	90	Lyonsville	100
Morristown	90	Brownsville	100
Gwynesville	90	Liberty	110
Arlington	90	Cottage Grove	110

Present rate—Sixth Class.

15390. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) and gravel, carloads, **Hugo, Ohio.** Following rates (in cents per net ton): **Proposed—To Erie,** Penn., 185c; to Grafton, Ohio, 90c; to Wickliffe, Ohio, 80c. Present rates—To Erie, 17c; Sixth Class; to Grafton, 100c per ton; Hugo to Wellington, Ohio, rate; to Wickliffe, 90c per ton; Hugo to Wickville, Ohio, 80c.

15391. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) and gravel, carloads, Cleveland, Ohio, to Erie, Penn. Rate of 175c per net ton. Present rate, 227c per net ton.

15392. To establish rates on **crushed stone,** carloads, Sulphur, Ohio, to Leonardsburg, Ashley, Ohio, and Cardington, Ohio, 50c, and to Galloways, Georgesville and Lilly Chapel, Ohio, 60c net ton. Present rate—To Leonardsburg, Ashley and Cardington, Ohio, 60c, and to Galloways, Georgesville and Lilly Chapel, Ohio, 70c per net ton.

15409. To establish rate of 70c per net ton on **crushed stone,** agricultural limestone or agricultural limestone screenings, carloads, subject to maximum absorption of 270c per car for switching, Lima, Ohio, to Glenmore and Wren, Ohio. Present rate, 80c per net ton.

15410. To establish rate of 90c per net ton on **sand** (other than blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) and gravel, carloads, Akron, Ohio, to Farrell, Sharon and Sharpsville, Penn. Present rate, 115c per net ton.

15411. To establish on **crushed stone,** carloads, Piqua, Ohio, to Athens and Pomeroy, Ohio, rate of 120c per net ton, and to Marietta, Ohio, 130c per net ton. Present rate: To Athens, Ohio, 18c; to Pomeroy, Ohio, 20c, and to Marietta, 20½c.

15413. To establish on **sand and gravel,** carloads, Columbus, Ohio, to Hamden, Jackson and Wellston, Ohio, rate of 100c per net ton and to Oak Hill, Ohio, 110c per net ton. Present rate, 120c per net ton.

15414. To establish on **crushed stone,** carloads, North Vernon, Ind., to Marysville, Ind., rate of 70c per net ton. Present rate, 90c per net ton.

SOUTHWESTERN FREIGHT BUREAU DOCKET

11755. **Lime,** from Ashgrove, Mo., to Mobile, Ala. To establish rate of 20½c per 100 lb. on lime, carloads, minimum weight 30,000 lb., from Ash Grove, Mo., to Mobile, Ala., Ash Grove, Mo., is usually grouped with Springfield, Mo., on lime and it is proposed to establish same rates as now applicable from Springfield. Shippers at Ash Grove are in direct competition with those at Springfield and are demanding to be put on the going basis.

11761. **Lime,** from Memphis, Tenn., and points taking same rates, to Oklahoma points. To establish rate of 35c per 100 lb. on lime as described in Item 3090-A, S. W. L. Trf. 15-M, carloads, from Memphis, Tenn., and points taking same rates to Clinton, Bessie, Cordell and Rocky, Okla. The present rate from Memphis to Clinton, Okla., via the C. & O. W. Ry., C. R. I. & P. Ry. and K. C. M. & O. Ry. is 35c per 100 lb., and it is desired to place the rate via the St. L.-S. F. Ry. on the same basis. It is necessary to advance the rate to the other points mentioned in order to clear Fourth Section.

11776. **Lime,** from Missouri points to Dallas, Texas. To establish rate of 27½c per 100 lb. on lime, carloads, minimum weight 30,000 lb., from Ash Grove, Springfield and Galloway, Mo., to Dallas, Texas. The Missouri points are now on the same basis as Johnsons, Limedale Spur and Ruddells, Ark., and shippers desire the same adjustment from Ash Grove, Springfield and Galloway as will be made from the Arkansas points.

WESTERN TRUNK LINE DOCKET

6005. **Sand and gravel,** carloads, minimum weight 90% of marked capacity of car except that when weight of shipment loaded to full visible capacity of car is less than 90% of marked capacity the actual weight will apply, but in no case shall the minimum weight be less than 40,000 lb., from Berlin, Wis., to Joliet, Ill. Present, $2.50 per net ton (class rate); proposed, $1.60 per net ton.

2051-Y. **Stone,** crushed, minimum weight 90% of marked capacity of car, from Dell Rapids, S. D., to Emerson and Stanton, Neb. Present, 9c to Emerson; to Stanton, 15½c (Sioux City combination); proposed, 8½c to Emerson; 11½c to Stanton.

2269-E. **Molding sand,** carloads, minimum weight 90% of marked capacity of car except that when actual weight loaded to full visible capacity of car is less than 90% of the marked capacity, actual weight will be the minimum, but not less than 40,000 lb., from Dallas City, Ill., to Fairfield, Iowa. Present, 7c per 100 lb.; proposed, $1.05 per net ton.

5369A. **Sand and gravel** and sand pit strippings. Minimum weight 90% of marked capacity of car, except that when weight of shipment loaded to full visible capacity of car is less than 90% of marked capacity, the actual weight will apply, but in no case shall the minimum weight be less than 40,000 lb., from Kansas producing points to Missouri destinations. Present and proposed, to a few representative points, as follows (rates in cents per net ton):

To	From Grinter, Morris, Muncie, Turner, Woodson Spur, Kan. Distance Note A	Pres. Note B	Prop. Note C
Birmingham, Mo.	13	70	90
Lawson, Mo.	39.7	80	90
Chillicothe, Mo.	86.5	110*	130
Powersville, Mo.	142.9	140	160

To	From Holladay and Zarah, Kan. Distance Note A	Pres.	Prop. Note D
Birmingham, Mo.	13	80	100
Lawson, Mo.	39.7	90	100
Chillicothe, Mo.	86.5	132	140
Powersville, Mo.	142.9	150	170

To	From Lawrence, Kan. Distance Note A	Pres.	Prop. Note E
Birmingham, Mo.	13	90	110
Lawson, Mo.	39.7	100	110
Chillicothe, Mo.	86.5	130*	150
Powersville, Mo.	142.9	160	180

Note A—C. M. & St. P. distance from Kansas City used.

Note B—Tariff authority C. M. & St. P. 9805-I, I. C. C. B5070.

Note C—Basis Nebraska joint scale subject to Kansas scale as minimum.

Note D—Basis 10c over Turner, etc., rates, authorized by W. T. L. Rate Advice 6330.

Note E—Basis 20c over Turner, etc., rates, prescribed by I. C. C. by order in Docket 15715, dated November 26, 1926.

*Present Turner, etc., rate in error, as W. T. L. Rate Advice 7025 authorized $1.22 net ton rate to Chillicothe, which would also have to be published to Sturges and Chula. Lawrence, Kan., rate wrong; should be 20c over proper Turner rate of $1.42 net ton.

5992. **Limestone,** poultry grits, carloads, minimum weight 36,000 lb. From Quincy, Ill., to points shown below:

To		Pres.	Prop.
Green Bay, Wis.		*20½	14
Madison, Wis.		*16½	11
Stevens Point, Wis.		*20½	14
La Crosse, Wis.		*17½	12
Eau Claire, Wis.		*19½	13
Houghton, Mich.		*33	22
Marquette, Mich.		*30½	20
Escanaba, Mich.		*24½	16
Menominee, Mich.		*24½	16
Duluth, Minn.	†13	*21	14
Ashland, Wis.	†13	*21	14
Superior, Wis.	†13	*21	14
St. Paul, Minn.	†12	*19½	13

*Class E rates. †Would govern per Item 1440, W. T. L. 5-M, when billed as crushed stone, but not when billed as poultry grits as here intended.

NEW ENGLAND FREIGHT ASSOCIATION DOCKET

11970. **Lime,** carloads, minimum weight 40,000 lb., from Highgate Springs, Fonda Jct., Swanton and Winoski, Vt., to Remsen, Prospect, Boonville, Carthage, Philadelphia, Cape Vincent, Pulaski, Oswego, Sterling, Wallington, Sodua, Beach Ridge, Charlotte and Lewiston, N. Y., 20½, via Rouses Point—Rut. R. R.—Norwood, N. Y. C. R. R. Reason—Rates are comparable with rate to Richland, N. Y., and other N. Y. C. stations in that territory covered by C. V. Ry. Trf. I. C. C A-5593.

11975. **Lime,** carloads, minimum weight 40,000 lb., from Winooski, Vt., to Montreal, Que., 16, via St. Johns-C. N. Rys. Reason—compares favorably with rate from Fonda Jct., Vt., to Coaticoke, Que., of 16c per 100 lb.

11985. **Sand,** core, carloads, minimum weight 90% of marked capacity of car, from Davisville, R. I., to West Mawah, N. J., 18½. Reason—Necessary to permit movement of shipments.

11986. **Agricultural limestone,** carloads, minimum weight 50,000 lb. per car, from Lee, Mass. (Note) to Congamond and Southwick, Mass., Northampton, Mass., 11½c; to Holyoke, Florence, Leeds, Haydenville, Williamsburg, Hatfield, Whately, South Deerfield, Deerfield and Turners Falls, Mass., 12½c; from Danbury (Conn. Agstone Co., Inc., Siding), Conn., to Congamond, Southwick, Westfield, Longmeadow and Armory, Mass., 11½c. Note:—Proposed rates from Lee, Mass., are to apply not only from that point, but are to be made the maximum on agricultural limestone, in carloads, from all lime producing points on the N. Y. N. H. & H. R. R. to the destinations shown. Reason—To permit of the movement of the traffic and also to enable Danbury shippers to enjoy the same rates as other producers in that vicinity.

11988. **Limestone,** ground agricultural, carloads, minimum weight 50,000 lb., from West Stockbridge, Mass., to Gloucester, Mass., 19½c. Reason—To provide rates comparable with other rates to nearby points.

Linwood Quarry Co.'s quarry at Linwood, Iowa, near Davenport. The operation is to be expanded by going deeper and opening a new face

Some Interesting Developments at Davenport, Iowa

DAVENPORT, Iowa.—the state "where the tall corn grows"—was paid a visit by one of ROCK PRODUCTS' editors, the week of April 4. For the last two or three years the rock products industry in this section has not been flourishing because of the disinclination of the Iowa state legislature to spend money for highway improvement, and because general business conditions in the corn belt, particularly Iowa, have been said to be none too good.

How much longer will a rich agricultural state like Iowa put up with conditions eloquently described in the following news item, clipped at random from a Davenport newspaper?

"Forced to Leave Cars After Drive to Iowa from South

"MAQUOKETA, Ia., April 5.—(Special)—Ben Nims and Harry Smith, who have spent the winter in Miami, Fla., and who drove home from there, are sure that the Charlotte-Maquoketa road is the height of something, for they found upon reaching there Sunday that they could not get through the rest of their way to their homes here. So they left their cars there and walked up the railroad track to Maquoketa, as there was no train on Sunday over that road. Mrs. Smith decided she would stay with the car and come by train Monday, and Hyle Streets also stayed for some sort of wheel service. Mr. and Mrs. Smith and Mr. Nims and Mr. Streets have driven in their two cars, visiting places of interest on the way, but had not seen any such mud as they met at Charlotte.

"Several other Maquoketa persons are now on the way by automobile from Florida, but hope to reach Charlotte on a week day when trains are running."

Or in this one, also from the same Davenport newspaper:

"Plank Bad Places in Jones County Roads; Still Impassable

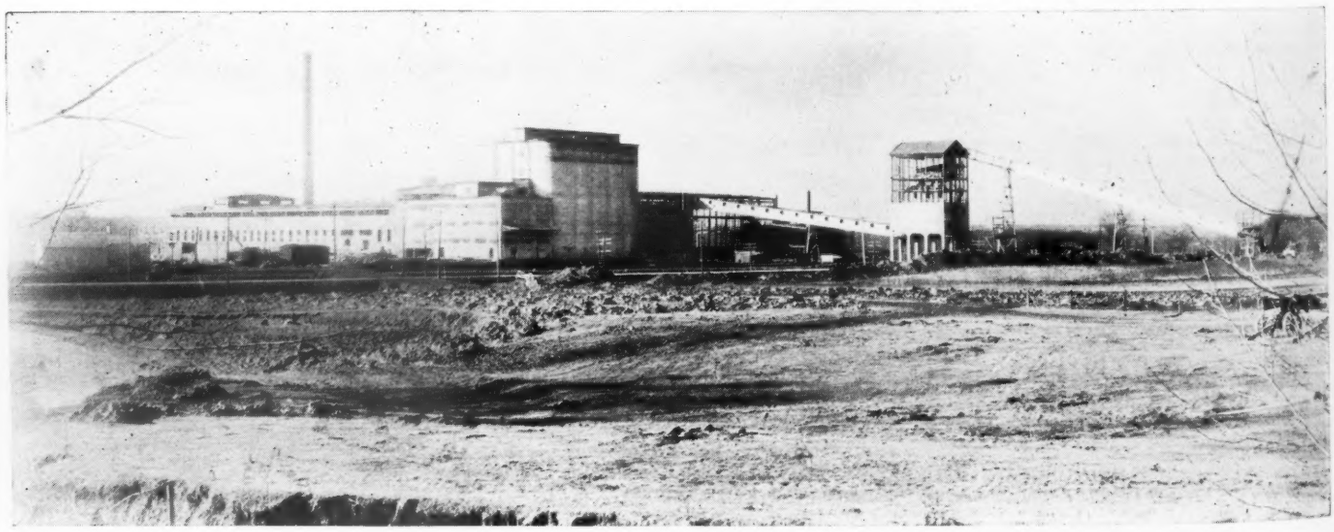
"MONTICELLO, Ia., April 5.—(Special)—The roads leading out of Monticello in every direction are impassable over any great distance. Between Monticello and Cedar Rapids planking has been laid over in many places, and in one particularly bad place the planking has sunk below the surface within the past two days.

"There are over 30 bad spots on this part of No. 161 and from Dubuque to Monticello on No. 161 it is impossible for automobiles to get through. Practically the only ones who can get by are the people who go by team.

"Over in Linn county, coming east, the roads are in a worse condition now than they have been any time this spring.

"The bus between Monticello and Dubuque and the one between Monticello and Cedar Rapids have been discontinued for some time. The rural mail carriers are making their daily trips by team."

The counties in Iowa are doing the only real highway improvement; and the county including Davenport has built some remark-



Recent view of the Davenport, Iowa, cement mill of the Dewey Portland Cement Co., which is expected to be in operation within a few months

ably fine concrete roads. These are but a small proportion of the roads throughout the state which have been improved.

The two quarries near Davenport—those of the Linwood Cement Co., Linwood, Ia., and of the Dolese Bros., Buffalo, Ia., are said to have orders for all the stone they can get out this year. This is going mostly into county highways. The agricultural limestone demand is strong, and promises to increase each year. The Linwood Cement Co. still intends to build a portland cement plant, and there seems to be a great deal of optimism on the future of this section, notwithstanding the alleged depressed condition of agriculture.

The Linwood quarry operation is about to be expanded by going deeper. The two well drills are now drilling the floor of the present quarry to open a new face. Both this quarry and the Dolese Bros. quarry are now on a concrete-paved highway west from Davenport. Both have profited from this new transportation service, which gives them motor-truck access to Davenport.

Dewey Mill Well Under Way

The new plant of the Dewey Portland Cement Co. is located on the same highway, between the two quarries already referred to. Construction is well advanced, and a considerable area has been stripped for a quarry opening, but as yet no quarry has been developed. The plant makes a striking appearance from the highway and is also on the main line tracks used jointly by the Chicago, Rock Island and Pacific and the Chicago, Milwaukee and St. Paul railroads, and during the editor's stay in Davenport it was announced that: "An immense electric sign will be placed on the highest part of the new plant reading— Davenport Plant— Dewey Portland Cement Co."

"We also have just added over $18,000 to our expense in making bags for cement, for we are adding the name 'Davenport, Iowa,' to our printing on the bags, in this way advertising the city on every big construction job where these bags will be used. The sign will be over 150 ft. high and visible from the business district of Davenport," President Frank Tyler said.

The total contracts let to date for the big plant amount to $2,108,000. The balance of the $3,000,000 will be signed for expenditure during the next few months.

A New Locomotive

The demonstration of a new gasoline-electric locomotive by the Davenport Locomotive Works on February 5 was an occasion of more than local interest, as the following account in the local press shows:

Perfection of a gas-electric locomotive which is expected to revolutionize switching service in industrial plants is announced today by the Davenport Locomotive Works. It is known as the "Davenport" gas-electric locomotive.

The announcement was accompanied by a demonstration this noon through the streets of the tri-cities, starting from the plant on Rockingham road.

The compact little engine drawing a huge gondola passed over the tracks of the Tri-City Railway Co. The gondola was loaded with supplies of the railway company. The streets were lined with interested onlookers.

At 10 a. m. today a demonstration of the uses to which the gas-electric locomotive can be put was given at the plant for a score of technical experts and representatives of industrial trade papers from all parts of the United States.

A luncheon for these visitors who came here expressly for the demonstration was given by E. P. Adler, publisher of *The Daily Times*, and Frank D. Throop, publisher of *The Democrat*, at the Davenport Chamber of Commerce this noon.

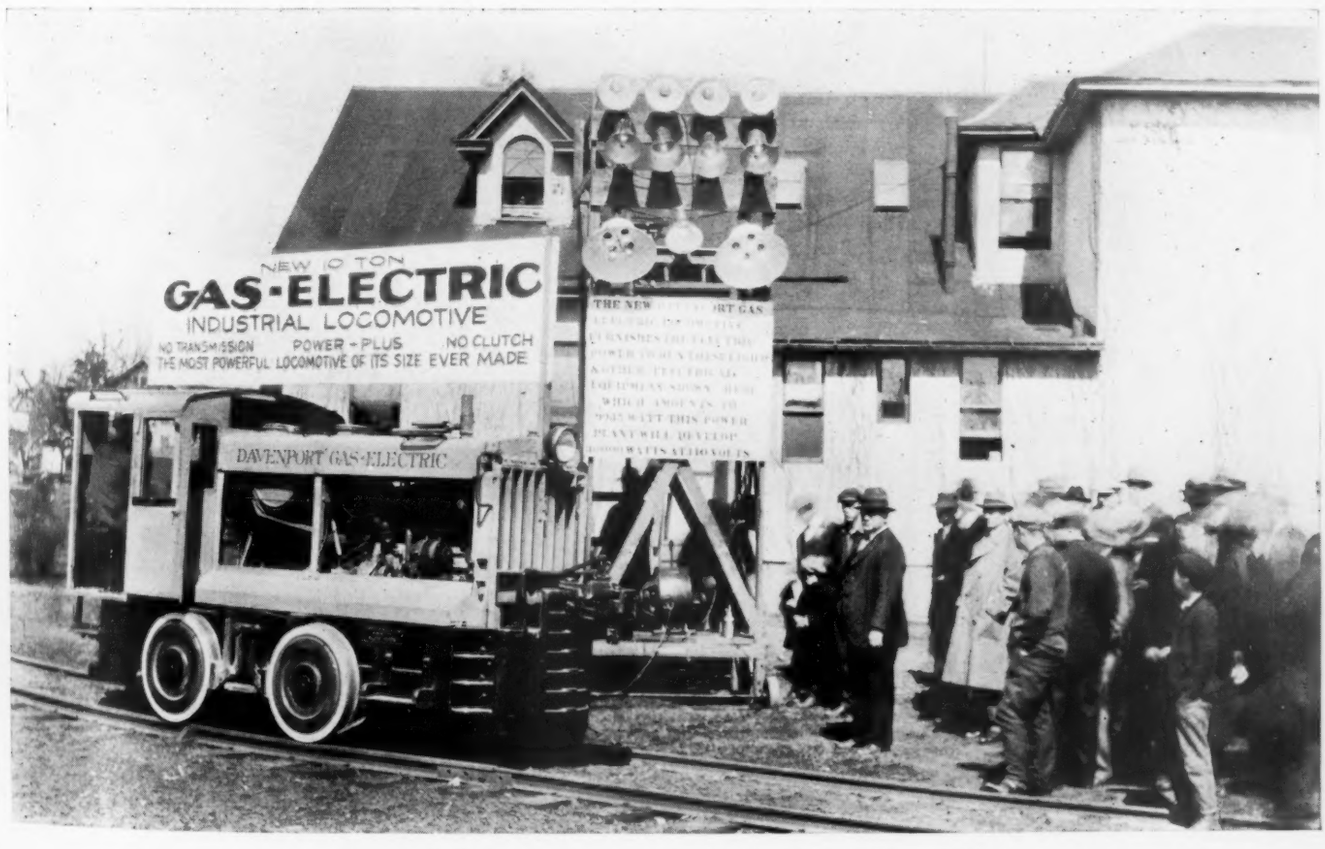
An intensive sales campaign both in this country and abroad is being started immediately, having been planned for months ahead. Once the product is established on the market, it will mean the hiring of about 300 additional workmen at the plant, E. Parmly, Jr., president and general manager of the Davenport Locomotive Works, stated.

Continued demands by users of steam and gasoline locomotives prompted the local concern to produce a locomotive with power equal to and, if possible, greater than steam with all its flexibility, but free from the constant supervision and maintenance, and the elimination of a mechanical clutch and geared transmission.

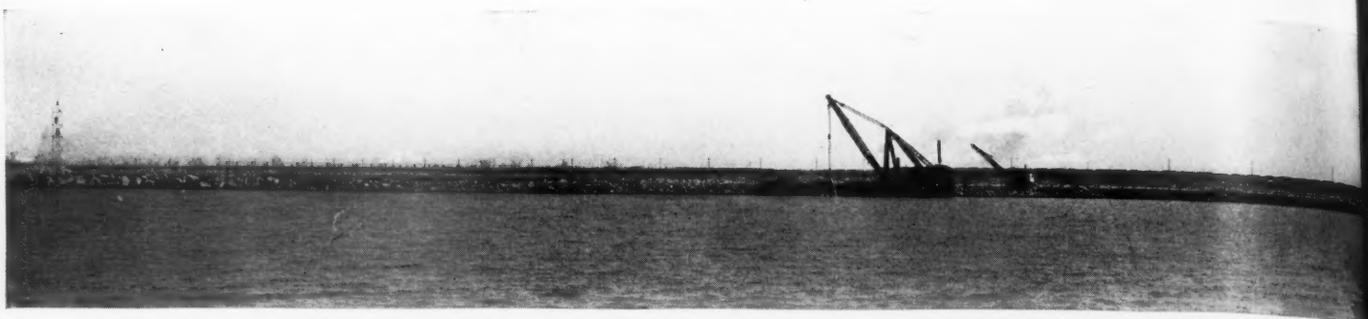
The locomotive is in 8, 10 and 12 ton sizes. It is to be used for industrial switching in brick yards, plantations, steel mills, coal mines, quarries, cement plants, logging and branch line railroads, and by contractors. It is the only gas-electric locomotive made in these sizes on the market today.

In addition to its uses for all kinds of switching it is also a portable electric power plant, and will generate as high as 240 volts by means of a large generator.

Its perfection is the result of months of study and experimenting in the engineering laboratories of the locomotive works. H. A. Bergert, chief engineer of the company, is largely responsible for the designing of the locomotive.


NEW 10 TON
GAS-ELECTRIC
INDUSTRIAL LOCOMOTIVE
NO TRANSMISSION POWER - PLUS NO CLUTCH
THE MOST POWERFUL LOCOMOTIVE OF ITS SIZE EVER MADE
DAVENPORT GAS-ELECTRIC

Demonstration of a new gas-electric locomotive at Davenport



Complete view of the recent harbor improvement at the Buffington, Ind., plant of the Universal Portland Cement Co. unloading Michigan limestone and loading finished cement on lake carriers. In the center is the unloading bridge

$2,000,000 Chicago Harbor Project Gives Universal Portland New Shipping Facilities

PROMPT shipments of cement by boat from Chicago to all ports on the Great Lakes, economical transportation of raw materials and coal to its Chicago plant and increased efficiency of operations due to dependable supplies of raw materials are some of the results that will follow construction of the $2,000,000 harbor project just being completed at the Chicago plant of the Universal Portland Cement Co.

Enlarges and Improves Service

"Combined with present rail transportation, which, of course, we shall continue to use, this new waterway development will improve and enlarge our service throughout the Great Lakes region," said B. F. Affleck, president of the Universal Company, to a representative of ROCK PRODUCTS.

New lighthouse lighting the harbor entrance

"Chicago already is one of the greatest railroad centers and one of the most important cement-shipping points in the country. With the addition of this new lake service, it will become a still greater cement-producing center with shipments radiating both by rail and boat throughout the Mississippi Valley and the Great Lakes territory."

The harbor is the deepest on the Great Lakes and, with its 55-acre basin, affords ample anchor space for several boats. A concrete dock over 1800 ft. long accommodates several vessels, permitting ships at the same time to unload cargoes of limestone and coal and load cement for shipment to lake ports. The harbor is protected by a breakwater 1200 ft. long and 33 ft wide.

Standing more than half a mile out in the lake and lighting the entrance to the harbor, the new lighthouse is now in operation. It is built from top to bottom of reinforced concrete and stands on a concrete base 30 ft. in diameter and 3 ft. thick, which, in turn, rests on a thousand tons of stone securely held together by a ring of interlocking United States steel piling driven into the lake bottom. The structure is 50 ft. high and carries a 4,000-candlepower electric light which can be seen 13 miles away. It is controlled and operated from shore by switches with submarine cables conveying the current to the lighthouse. The United States lighthouse officials of the 12th district not only approved the lighthouse plans but commended the results secured.

Million-Ton Storage

Helping to maintain continuous plant operations, the new storage yard is an essential industrial feature of the improvement. Its capacity of a million tons of limestone or coal provides ample storage for raw materials against close of navigation and helps to insure more continuous production of cement even in rush construction seasons when demands are greatest.

"The largest and fastest freighter on the Great Lakes, now being completed, will be an important feature of this waterway development," said Mr. Affleck. "It is completely electrified craft 635 ft. long and 65 ft. wide with a capacity of from 12,000 to 15,000 tons of limestone. With its self-unloading equipment, it can empty its hold at the rate of nearly a ton a second."

B. F. Affleck, president, Universal Portland Cement Co.

In addition to such specially built self-unloading boats, standard lake steamers will also bring in large quantities of raw materials. These will discharge their cargoes by means of a boat-unloading bridge 633 ft. long—one of the largest and heaviest of its kind in the Chicago district. Equipped with a 10-ton clamshell and being movable to any spot along the entire length of the dock, it can pick up its large load from steamers docked at any point or from any part of the storage yard and deposit it on

or is now the deepest on the Great Lakes. The concrete dock is 1800 ft. long and 600 ft. wide and has facilities for which is equipped with a 10-ton clamshell bucket. The mile long conveyor tunnel and cement mills shown at right

conveyors for speedy transportation to the plant.

Mile Long Conveyor

Nearly a mile long and enclosed in a concrete tunnel, these electrically operated conveyors can carry limestone from harbor to plant at the rate of 350 tons an hour or nearly 6-tons a minute. With their daily carrying capacity of over 8000 tons, the conveyors will help provide the steady supply of raw materials essential to uninterrupted production.

These new harbor facilities, fast boat service, modern unloading equipment and storage capacity of hundreds of thousands of tons of material make the improvement one of the outstanding waterway developments in the Chicago district and mark another forward step in the growth of that city as a cement-producing and cement-shipping center.

Georgia Portland Officials Inspect Properties

AN inspection of the limestone and clay deposits of the newly organized Georgia Portland Cement Co., Augusta, Ga., was recently completed by officials of the company accompanied by several prominent business men of Statesboro and Sandersville. The company owns about 867 acres near Sandersville on which a new 1,500,000 bbl. portland cement mill will be built. The test borings are reported to have been completed and the design of the mill well under way by the H. K. Ferguson Co., Cleveland, who have the contract for erecting.

J. Lee Hankinson is president of the company and J. C. Hagers, vice-president. Both men are executives of the Georgia-Carolina Brick Co.—*Augusta* (Ga.) *Chronicle.*

British Quarry Managers Plan Annual Conference

THE British Quarry Managers will hold their annual conference and exhibition of quarrying plant, machinery, etc., from June 27 to July 1 at Harrogate, one of the leading health resorts in England.

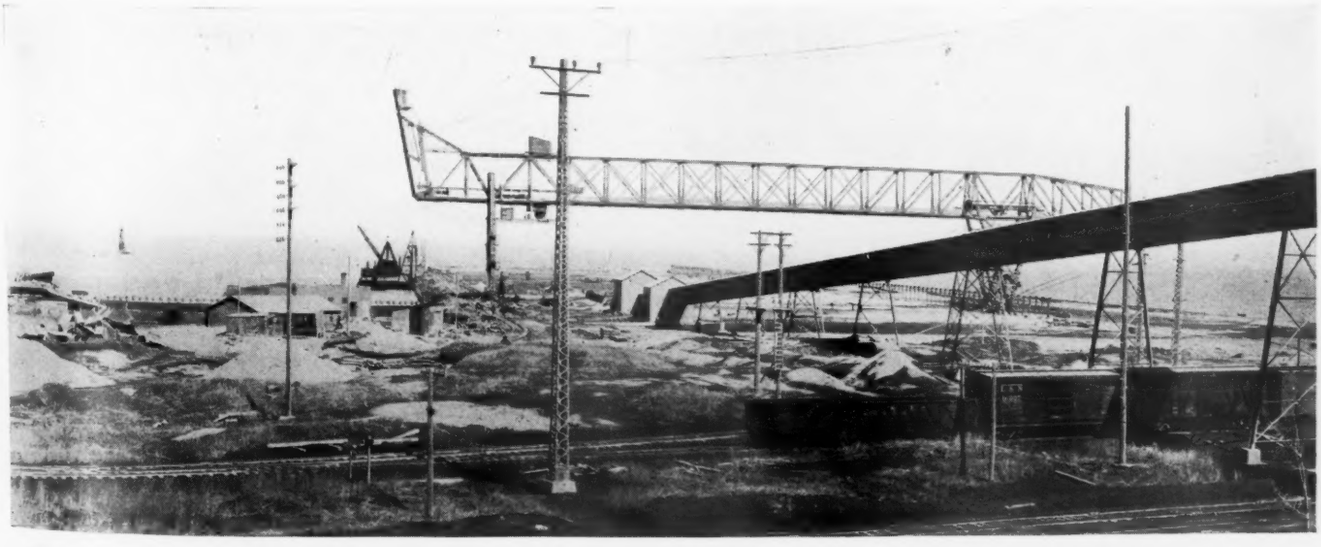
The great success of the first exhibition held last year is likely to be followed by an even more successful exhibition this year, many of the firms having taken larger spaces in which to exhibit their machinery.

Crude oil engines are again to be a leading feature, these engines having become increasingly popular of late years as power suppliers in quarries. Last year over 500 tons of machinery were on view at the exhibition, and this figure will be exceeded this year.

There are a few new features introduced in the conference program, the most revolutionary from an Englishman's viewpoint, being that there will be no long papers read. A number of lecturettes is to take the place of the papers, each lecturer being restricted to eight minutes. Time will be allowed for discussion and verbatim reports of the lecturettes and discussions will be published.

Fred C. Murphy Joins United Electric Limestone Co.

F. C. MURPHY, well known figure in the rock products industry and for the past 10 years secretary and general manager of the Brownell Improvement Co., Chicago, has left that concern to accept a position of vice-president with the United Electric Limestone Co., a subsidiary of the United Electric Coal Co., New York. Mr. Murphy will be in charge of rates of all crushed limestone produced by the United company in its operations near Pyatt and Duquoin, Ill. Headquarters for the time being will be at the Bell Bldg., Chicago.



The 633 ft. boat unloading bridge—one of the largest and heaviest of its kind. Conveyors carrying limestone from the harbor to the plant nearly a mile away run in the concrete tunnel shown here

Flints in Limestone

EDITOR, ROCK PRODUCTS:

WE have read with considerable interest your comment on page 75 of your March 19 issue under the title of "Flints in Limestone," and we agree heartily with your suggestion that general exclusion of a type of material over large geographical areas should not follow action in a particular case without sufficient evidence to justify such action.

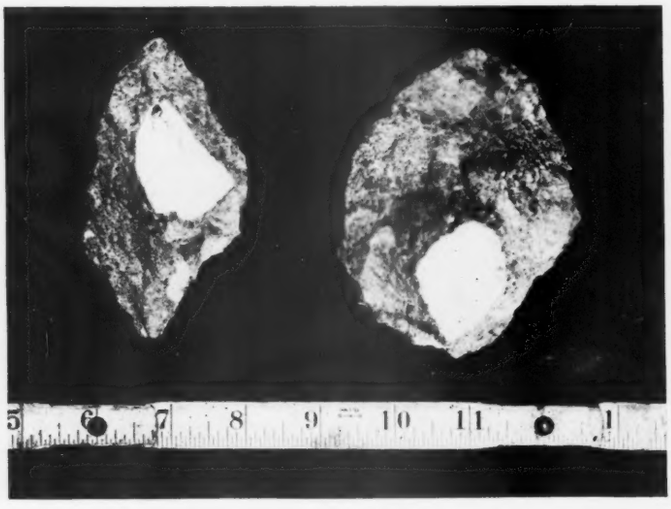
However, from reading your comments, we are forced to believe that perhaps the impression may be gained by many readers that the matter of the disintegration of the material in question is of rather small importance, even in the localities where this action is encountered and, if so, we should like to correct this impression.

Reference to the article in the August, 1924, issue of the *Engineering News-Record* will show that the writer was careful to distinguish between chert as defined in the article and flint. The article also stated that the action did not persist in the material after the same had been broken down to form the aggregate commonly known as "chert gravel."

In your comment you direct attention to a statement by Dr. Loughlin to the effect that the presence of gravel deposits after the disintegration of limestone could be taken as ample proof of the stability of the original material. The writer would like to respectfully differ with this statement. It was very clearly demonstrated in the investigation reported in the article mentioned above that the chert, as found in the limestone ledge, was unstable when crushed from the ledge but was stabilized when broken down under weathering and subjected to the action of chemicals in stream and ground waters. It, therefore, follows in this case, at least, that the presence of the stable gravel was no evidence of the stability of the original product as regards frost action.

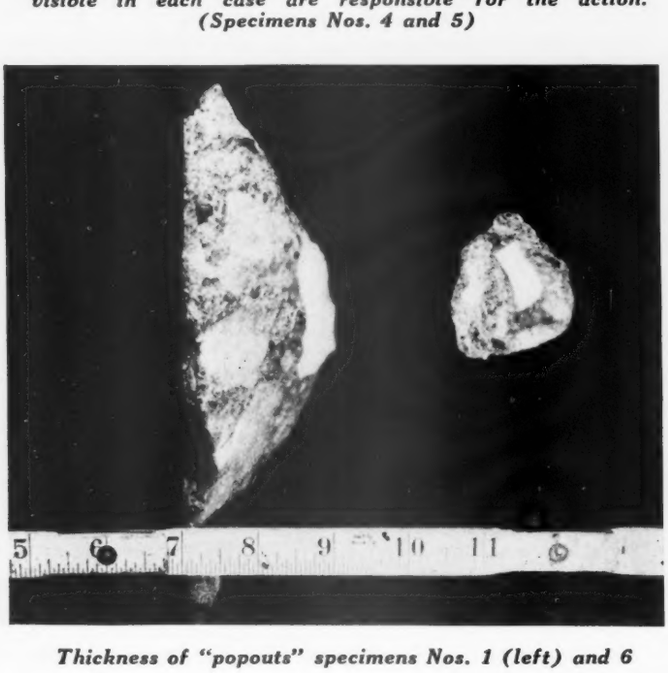
For your general information we would advise that the Materials Bureau of the Missouri Highway Department has been carefully observing the action of crushed chert as present in crushed limestone under exposure to frost action in our pavements, and observation has proven that the presence of the chert in question results in surface action in all cases. We have counted several hundred of the "pop outs" in single sections of 18-ft. concrete, 100 ft. in length, and successive seasons show added effects.

In order to be as practical as possible in view of the investment of the producer, we have permitted 5% of this material in our coarse aggregate, permitting the unsightly surface effect and the attendant criticism rather than to exclude the producer from furnishing any aggregate for our use. Our preference would be, however, to entirely eliminate the effect, even at a higher cost for our coarse aggregate.

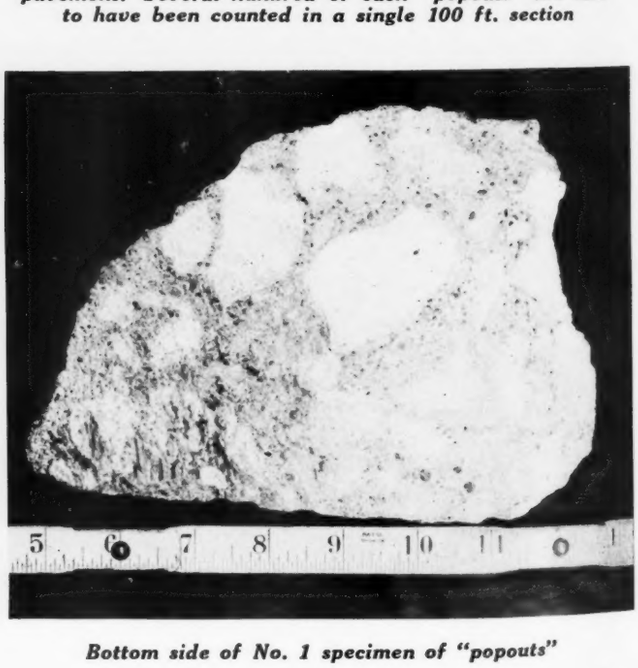


"Popouts"—Bottom side. The light colored pieces of chert visible in each case are responsible for the action. (Specimens Nos. 4 and 5)

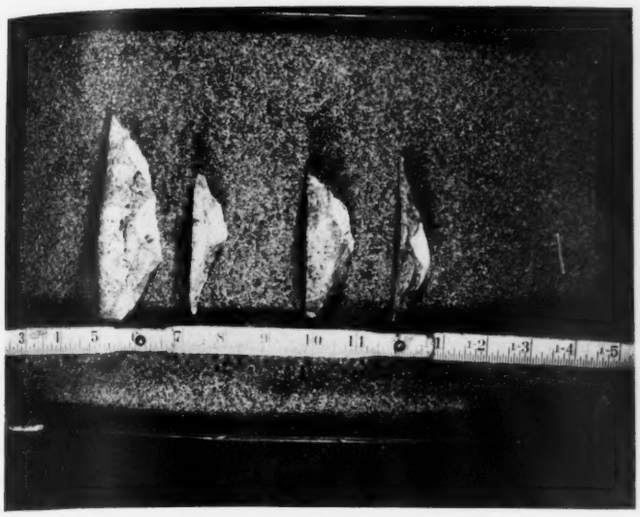
Showing the "popout" and the hole left in the concrete pavement. Several hundred of such "popouts" are said to have been counted in a single 100 ft. section



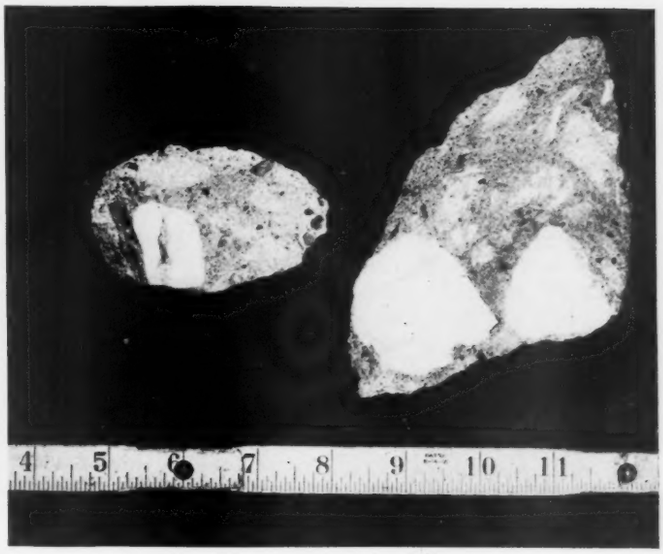
Thickness of "popouts" specimens Nos. 1 (left) and 6



Bottom side of No. 1 specimen of "popouts"



View showing the thickness of the "popouts." Left to right, specimens Nos. 3, 2, 5, 4



Bottom side "popouts," specimens Nos. 2 (left) and 3

In regard to your information that evidence of the instability of chert, as found in Burlington limestone, has been confined to Missouri, we would advise that we have received information from several localities reporting similar action and we know of at least one other highway department having taken a similar stand to ours.

In conclusion, we wish to repeat that we are in agreement with the general sentiment expressed in your editorial and we have no desire to start any controversy in this connection. Our remarks are offered for general information in case they might, in your judgment, be pertinent to the subject discussed in your editorial.

As a matter of interest in this connection, we are enclosing several photographs picked at random from our record showing the size range of the pieces of concrete broken from the pavement by frost action and the effect on the pavement. Your imagination can picture for you the appearance of the surface of a 100-ft. section of pavement containing several hundred such "pop outs" and the reaction of the traveling public (when sufficiently agitated by the opponents of concrete paving) to the appearance of the pavement after asphalt has been applied to the points affected.

F. V. Reagel,
Engineer of Materials, Missouri State Highway Department.

New Vancouver Gravel Project

THE Deeks Gravel and Rock Co., Vancouver, B. C., have acquired 125 acres west of Coquitlam, B. C., and will spend about $125,000 on a plant for working the deposit. The material in the property is estimated at 15,000,000 cu. yd. The plant will be equipped with modern gravel handling and washing equipment. The company has also acquired rights for the use of a standard gage railway from the plant to Port Moody, a distance of some two miles, and it will purchase a locomotive and other rolling stock. The stock pile to be maintained at Port Moody will be about 10,000 yd.

Alabama Will Collect on Sand Dredged from River Beds

ALL companies who are removing sand and gravel from the beds of rivers in Alabama will be required to pay a royalty to the state, according to a recent decision by Governor Graves. An investigation is being made of various reports of the removal of sand and gravel from rivers by private interests and individuals and if necessary a survey will be made of the rivers.

The constitution of the United States specifically reserves to the states the ownership of the bed and banks of streams and on this basis the governor has decided that a suitable royalty is due the state from the sand and gravel removed. The report states further that Governor Graves is of the opinion that the sand and gravel of the river beds should be used by the state in its road building program, the surplus not needed to be sold and the proceeds be placed in the state treasury.

Production of sand and gravel has become an important business in Alabama in recent years due to the national road-building campaign. Large sand and gravel companies are shipping many carloads daily from the Montgomery territory. The state and neighboring states are consuming thousands of carloads annually in road building and construction.

Ownership by the state of all sand and gravel in the beds of the rivers was first asserted by Gov. Thomas E. Kilby about 1922. He entered into contract with several persons by which they were to be permitted to take sand and gravel from the beds of certain rivers in central Alabama, the condition being that they were to pay a royalty to the state.

About the time the contract was made large deposits were found in central Alabama and two companies organized for the mining operations. This competition was regarded as formidable and the plan for the removal of sand and gravel from the streams was never perfected.

In recent days Governor Graves has been informed, however, that in at least one instance individuals are taking sand and gravel from a river and have failed to make an accounting to the state. Governor Graves has indicated that he will protect the state's rights to the commodities even if it is necessary to take the case to the supreme court.—*Montgomery* (Ala.) *Journal.*

Self-Unloader Will Soon Be in Service

THE hull of the new self-unloading limestone carrier *Carl T. Bradley* for the Bradley Transportation Co. of Rogers City, Mich., was launched on April 9 at Lorain, Ohio. The vessel is being constructed in the American Shipbuilding Co. yard, and will be the largest and most modern ship of its class in the world.

This will be the second boat of that type to be put in service by the Bradley company. The first was the *T. W. Robinson,* which went into service in July, 1925, and has been operating successfully since that time. It will be a much larger boat than the *T. W. Robinson,* and the power plant will be of greater horsepower rating. The electrification of auxiliaries will be more complete.

The electrical equipment for the boat, including the power plant, will be furnished by the General Electric Co. Electricity for operating the main propulsion motor and auxiliary motors will be furnished by a complete turbine-generator power plant normally rated 4200 shaft horsepower and having a maximum rating of 4800 shaft horsepower. This is the second application of turbine-electric drive to a bulk freighter, the first being made on the *T. W. Robinson.*

Foreign Abstracts and Patent Review

Study of the Heat Economy of the Rotary Kiln. The author (Stehmann) began his tests on shaft kilns. He then made an attempt to apply the results of his observations to rotary kilns. He gives examples of the heat balance of dry-process rotary kilns using material readily and less readily calcined. The length dimensions of the kiln receive special attention. The heat balances are compared with those of the shaft kiln, and the advantages of the new calcination method invented by the author are shown. This is followed by examples in the form of data obtained on kilns remodeled in accordance with this method. The wet process is then discussed and two heat balances worked out for two kinds of material as above, to which 40% water is added. A heat balance is derived theoretically for the same conditions but with the use of the new method. In conclusion, practical data are cited taken from wet process kilns making use of Stehmann's method.

The author finds that the air used up in the rotary kiln is twice that of the shaft kiln. Considerable quantities of fuel are expended in heating this excess air. The Stehmann method consists of limiting the air supply and regulating it by means of control devices in accordance with the values computed in the heat balance.

Tests were made in 1924 in a rotary kiln 30 m. (100 ft.) long and 2 m. (6 ft. 8 in.) in diameter to determine the proper length of the cooling zone in an effort to have the clinker give up a maximum of its heat to the air. The quantity of air admitted was measured. It appeared that in reducing the air supply a considerable saving of fuel resulted.

The plants designed in accordance with the author's ideas have shown that it is possible to calcine 1 kg. clinker by the dry process with only 1130 to 1300 WE. and by the wet process (40% water) with 1550 to 1750 WE. (Note: This in the usual American terms using a bituminous coal of about 12,000 B.t.u. per lb. is equivalent to ratios of 5½ to 6 lb. of clinker per lb. of coal for the dry process and from 4 to 4½ lb. of clinker per lb. of coal for the wet process.) These variations are caused mainly by the kind of material used, the amount of water added in the wet process, easily or otherwise soluble silica, high or low lime content and the amount of flux. Other factors affecting the heat balance are uniform charging, easily controlled fuel supply and the loss of heat through conductivity of the walls. The author maintains that his invention means a considerable step forward in knowledge of the calcination processes.—*Tonindustrie-Zeitung* (1927), 157-159, 174-177.

Cellular Concrete. Alcohol or acetone solutions of natural or artificial resins, glycerine, cellulose or rubber derivatives to which may be added formalin are mixed with a foam producing agent comprising a colloidal solution of glue, gelatin or glucoside and saponin-containing materials with or without the addition of soap or formalin. The mixture is beaten to form a foam and added to cement mortars to produce a strong porous or cellular concrete. *J. A. Rice, British Patent No.* 263,571.

Preparation of Cement Raw Materials for Rotary Kiln Process. Raw cement materials are crushed and made into slurry which is squirted in narrow strips on to a conveyor running in heated chamber. The strips are partially cut through so that upon delivery to a rotary drum the strips break up into small spherical fragments. These are dried at low temperature, heated and fed into a rotary kiln. Better fuel ratio is said to result from the use of the small uniform fragments of dried slurry. *I. E. Lanhoffer, British Patent No.* 263,221.

Swiss Cement Standards. First standards were formulated in 1881 and called for cement mortar (1:3) to have a 28-day tensile strength of 12 kg./cm.² (170 lb./in.²). The requirements were raised in 1883, 1887, 1900, 1919 and 1925. The standards adopted in 1925 were based on results obtained on 17 brands of regular portland cement and three brands of high-test portland cement by the *Laboratorie Federal d'Essai des Materiaux* (*L. F. E. M.*). The averages found for the 17 brands show the following tensile strengths: 3-day, 27 kg./cm.² (385 lb./in.²), 7-day, 30 kg./cm.² (430 lb./in.²) and 28-day, 37 kg./cm.² (530 lb./in.²). The compressive strengths are: 3-day, 248 kg./cm.² (3500 lb./in.²), 7-day, 340 kg./cm.² (4800 lb./in²), and 28-day, 453 kg./cm.² (7500 lb./in.²). The standard specifications call for tensile strengths of 20 kg./cm.² (284 lb./in.²) in 7 days and 28 kg./cm.² (396 lb./in.²) in 28 days; compressive strengths of 230 kg./cm.² (3250 lb./in.²) in 7 days and 325 kg./cm.² (4650 lb./in.²) in 28 days. All tests to be made with 1:3 mortar.

The standards adopted for high-test cements are as follows: Tensile strength, 3-day, 28 kg./cm² (396 lb./in.²); 7-day, 35 kg./cm.² (495 lb./in.²), and 28-day, 40 kg./cm.² (568 lb./in.²). Compressive strengths, 3 day, 325 kg./cm.² (4600 lb./in.²); 7-day, 500 kg./cm.² (7200 lb./in.²), and 28-day, 650 kg./cm.² (9300 lb./in.²). These are all lower than the average of three brands investigated.

Future work by the L. F. E. M. will be to obtain data on specific gravity, weight of a unit of volume, duration of set (should be known to regulate working time), heat developed on setting. In some massive walls a heat rise of 30 deg. C. was obtained. It is essential in working fused cement to make provision for the escape of heat, fineness of grind (important in developing hydraulic qualities), stability of volume in hot water and in hot dry air, loss on ignition to determine water and calcium carbonate contents (both being usually not desirable), resistance to compresison and tension of 1:3 normal mortar for 7 and 28 days of aging, compressive strength increase of plastic mortar as compared with tamped mortar, as the plastic mortar increases more rapidly in strength than the tamped (after 3 days), contraction with time, determined on prisms, maintained in a humid atmosphere, made with special portland cement, mortar 475 kg. cement and 1 cu. m. sand, 11% water (plastic method); the concrete made with 250 kg. cement with 1 cu. m. of sand and gravel (1:2), 7.2% water (plastic method), elasticity of concrete, variations in properties of cement made over different periods and extreme values for the hydraulic modulus, insoluble residue, gypsum and magnesia. *Rev. des. Con. Trav. Pub.* (1926), **205**, 293-300.

Rotary Kiln. One or more conical sections are placed in various positions along the length of a rotary cylindrical kiln. The base of the cone may be equal or greater than the kiln diameter and its position lies towards the feed-end of the kiln. The angle between the axis of the cone and its side is greater than the inclination of the kiln to the horizontal. Internal lifters are provided to lift the material from the conical section to the cylinder section, and other lifters oppositely inclined are provided in the conical section to increase the delay of material held there. *J. H. Bentley, British Patent No.* 263,630.

Waterproof Composition. Fine ground stone (stone flour) is mixed with water to a thick consistency, the mixture boiled and liquid bitumen or mineral wax added, with agitation, until a thick paste is obtained, which on cooling forms a waterproof, elastic cement. *R. Illeman, British Patent No.* 262,961.

Rotary Cement Kiln. The rotary kiln shell is extended beyond the discharge end and ports placed in the extension wall, through which the calcined cement material passes to a number of smaller rotary coolers surrounding and rotating with the main shell. The discharge end of the coolers are open and outgoing material cooled by the incoming air. Baffles are placed over the open ends to prevent material falling out of any of the cooler sections when it is above the furnace. *Vickers, Ltd., and L. D. Parker, British Patent No.* 262,525.

Magnesia Cement and Colloidal Silica. The author (Luftschitz) made a study of the effect of colloidal silica on magnesite, as he had previously observed a considerable rise in strength of dolomitic limes due to such admixtures. The beneficial effect of

colloidal silica on portland cement, when added in quantities of 2 to 20%, and on lime, when added in quantities of 50% or more, was also familiar to him.

The colloidal silica used in the tests was obtained from a chemical company in Niedersedlitz and was a byproduct of the manufacture of aluminum sulfate, resulting from the decomposition of clay by sulfuric acid.

Temperature measurements were made on large size specimens. It was found that the high temperatures produced within such specimens of magnesite could be reduced by admixtures of silica from 200 deg. C., at which temperatures unsoundness is unavoidable, to temperatures below the boiling point of water.

The author concludes that silica has a highly beneficial effect on magnesia products, resulting from the calcination of magnesium carbonates. He thinks it possible to obtain magnesia cements of greater strength and durability than either portland or alumina cements. He urges further researches on the subject of colloidal admixtures. The favorable effect of silica on magnesite was proven by him recently when 17% colloidal silica added to Sorel mortar yielding ordinary tensile strengths of 50 to 75 kg. cm.^{2} (710 to 994 lb./in.^{2}) caused a rise of strength up to 100 kg./cm.^{2} 1420 lb./in.^{2}. *Tonindustrie-Zeitung* (1927) **14**, 207-8.

Lime-Silica-Alumina System. R. Grun discusses the ternary diagram and the ranges and properties of mixtures and compounds of the $CaO{\cdot}SiO_2{\cdot}Al_2O_3$ system. *Naturwissenschaften* (1926), **14**, 869-73.

Sulphur Dioxide from Gypsum and Slag. Neumann found that heating a mixture of gypsum and blast furnace slag at high temperature, a yield of about 90% SO_2 gas was obtained. The reaction goes according to the equation:

$$CaS + 3CaSO_4 = 4CaO + 4SO_2$$

The CaS is from either the slag or the decomposition of $CaSO_4$ at the high temperatures. Calcium sulphide (CaS) is rapidly oxidized by air at temperatures below 1000 deg.; the SO_2 yield is poor, for the greater part of the sulphur remains fixed as sulphate. Mixtures of sulphide and sulphate gave poor yields of SO_2 on a current of air, but in nitrogen and at higher temperature the yield was almost theoretical. Similar results obtained from slags containing CaS or $CaSO_4$ prove that the procedure of blowing slag with air for sulphur recovery is not feasible. *Zeitschrift fuer augewandte Chemie* (1926), **39**, 1537-42.

Improved Shaft Lime-Kiln. Air is admitted into the kiln through the wall or centrally, the air flues being provided with dampers. The vents open into the combustion zone and also into the calcining zone, the air before admission to the kiln being pre-heated in flues provided in the kiln wall. *British Patent No.* 245,653.

Catalyst for Hydraulic Cements. Calcium chloride (calcined) to which may be added lime or calcium sulphate as a retarder, is mixed with sufficient silicic acid to make a solid product suitable for storage. *British Patent No.* 262,294.

Molded Magnesite Articles. Fibrous materials and magnesite cement (Sorel) are heated together at a temperature of about 180 to 220 deg. F. until the hardening is completed. Heating is best carried out in electrically heated apparatus or in airtight chambers through which the materials are conveyed on belts, etc. *K. Erdmann, British Patent No.* 258,731.

Recent Process Patents

The following brief abstracts are of current process patents issued by the U. S. Patent Office, Washington, D. C. Complete copies may be obtained by sending 10c to the Superintendent of Documents, Government Printing Office, Washington, for each patent desired.

Utilization of Heat from Cement Clinker. The discharged clinker in a hot condition is allowed to fall upon an endless chain grate in a confined chamber. Air is introduced under forced draft in this chamber, recirculated in and about the clinker, and then withdrawn to a waste heat boiler where the heated air is utilized to generate steam. After this air is used in steam generation it is brought back to the closed clinker chamber, where it is again passed over and through the clinker, thus maintaining a complete cycle for the air. The cooled clinker falls to a screw conveyor and is carried to storage or grinding mills. *William S. Speed, U. S. Patent No.* 1,606,850.

Vertical Kiln for Burning Spalls and Ordinary Size Limestone. A lime kiln comprising in combination a central stack to receive large pieces of limestone surrounded by a series of vertical passages to receive the spalls. The heat is passed through the central passage, calcining the coarse material contained therein. The spalls are decomposed by the heat conducted through the walls of this cement passage. Each passage has a separate closure which retains the different materials and permits selective withdrawal. *Wilburt Ward, U. S. Patent No.* 1,610,906.

Cement Roofing Compound. Mixture of 20% cement, 20% sand, 20% plaster, 18% asbestos, 4% varnish and 18% oil of tar. *Ignatz Gedarovich, U. S. Patent* 1,618,078.

Gypsum Wallboard. Composition board comprising a backing strip of paper and a facing or reinforcing strip of fibrous material such as cotton gauze or netting, the cementitious material between consisting of a mixture of gypsum plaster and asbestos. *C. A. Peters, U. S. Patent No.* 1,604,236.

Cement Building Unit. Blocks are made of a composition consisting of 19 parts cinders, sand about 12⅔ parts, cement 8⅓ parts and water 2⅔ parts, all measurements by weight. *H. B. Abbott, U. S. Patent No.* 1,620,312.

Concrete Aggregate from Blast-Furnace Slag and Red Mud (aluminum manufacturing residue). Blast-furnace slag is converted to an article suitable for manufacture of building blocks, tile, slabs as well as concrete aggregate or paving material by adding sufficient red mud to combine with the uncombined bases in slag. Red mud is a by-product of the electrolytic process of recovering alumina from bauxite or other aluminous clays and contains from 20 to 40% alumina with other metal oxides. The red mud is added to the slag in a ladle or other receptacles. The temperature of the slag should be never less than 2400 deg. F., at which the alumina in the mud combines with the free lime in the slag to form calcium aluminate. *Joseph M. Hilbish, U. S. Patent No.* 1,614,525.

Non-Deteriorating Dry Quick-Setting Lime Plaster. Dry quick-setting cementitious mixture resistant to deterioration during prolonged storage and retaining its ability to set quickly thereafter, comprising hydrated lime and a quick setting agent such as magnesium or sodium carbonate, the particles of which are covered with a protecting coating, said coating being sufficiently firm so as to avoid intimate mixture with the hydrated lime during storage. The coating is a water soluble compound such as starch, gum arabic, etc. In practice, the sodium carbonate or magnesium carbonate or a mixture of both is mixed to a damp paste with a boiled starch solution made by boiling 1 part starch to 100 parts water. To this paste sufficient carbonate is added to form a thick pasty mass which is allowed to air-dry at a temperature of 212 deg. F. Sizes and shapes of these pellets may vary, but material about 40-mesh is most desirable. The amount of starch required is about 60 lb. per ton of magnesium carbonate. *F. C. Mathers and S. C. Shirley, U. S. Patent No.* 1,607,472

Potash and Alumina from Leucite. Leucite is treated with lime at a high temperature until melting is induced and the mass then cast so that it forms large lumps, which are then molded in such a way as to cause them to disintegrate into a powdery mass. *Felix Gourdan, U. S. Patent No.* 1,620,212.

Lightweight Gypsum Block. Calcined gypsum is gaged with water and a suitable quantity of carbon dioxide gas forced into the resulting putty and the entire mixture poured into molds. The method is said to permit addition of excess water without impairing set or strength of finished block. Increased volume per unit, consequently lighter block, is claimed through the use of the CO_2 in the process. *Layton M. Parkhurst* (assignor to Federal Gypsum Products Co., Chicago), *U. S. No.* 1,620,915.

Hydraulic Classifier for Pulverized Material. Material from a bin outlet is collected by an ejector jet of water and the mixture passed to a vortex chamber with two outlets. Coarse material passes through one outlet to the settling chamber. The overflowing water regulates a float which causes intermittent opening and shutting of a water-supply valve. *L. Andrews, U. S. No.* 1,610,725.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., at producing point or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.30	1.30	1.30	1.30	1.30	1.30
Chaumont, N. Y.	.50	1.75	1.75	1.50	1.50	1.50
Chazy, N. Y.	.75	.....	1.60	1.30	1.30	1.30
Coldwater, N. Y.—Dolomite			1.50 all sizes			
Danbury, Conn.	2.25	2.25	2.00	1.75	1.50	.....
Dundas, Ont.	3.04	1.05	1.05	.90	.90	.90
Frederick, Md.	.50@ .75	1.20@1.30	1.15@1.25	1.10@1.15	1.10@1.15	1.05@1.10
Munns, N. Y.	1.00	1.50	1.50	1.40	1.25	1.25
Northern New Jersey	1.60	1.50@1.80	1.30@2.00	1.40@1.60	1.40@1.60	.....
Prospect, N. Y.	1.00	1.50	1.40	1.30	1.30	.....
Walford, Penn.	.70	.....	1.35h	.....	.....	.....
Watertown, N. Y.	1.00	.....	1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL						
Alton, Ill.	1.85	.....	1.85	.....	.....	.....
Bloomville, Middlepoint, Dunkirk, Bellevue, Waterville, No. Baltimore, Holland, Kenton, New Paris, Ohio; Monroe, Mich.; Huntington, Bluffton, Ind.	1.00	1.10	1.10	1.00	1.00	1.00
Buffalo, Iowa	1.10	.....	1.50	1.30	1.35	1.35
Chasco, Ill.	1.00@1.30	.....	1.00@1.15	.....	1.00@1.15	.....
Columbia, Krause, Valmeyer, Ill.	1.10@1.50	1.10@1.25	1.20@1.35	1.10@1.35	1.10@1.35	‖1.25
Flux (Valmeyer)	1.10@1.50	.....	.....	1.75	.....	1.75
Greencastle, Ind.	1.25	1.25	1.15	1.05	.95	.95
Lannon, Wis.	.80	1.00	1.00	.90	.90	.90
Linwood and Buffalo, Iowa	1.10	.....	1.50	1.30	1.35	1.35
McCook, Ill.	1.00	1.25	1.25	1.25	1.25	1.25
River Rouge, Mich.	1.20	1.20	1.20	1.20	1.20	1.20
Milltown, Ind.	.....	.90@1.00	1.00@1.10	.90@1.00	.85@ .90	.85@ .90
Montreal, Que.	.90	1.35@1.45	1.15	.95	.90	.90
Mt. Vernon, Ill.	1.10@1.20	1.00	1.00	1.00	1.00	.....
Sheboygan, Wis.	1.10	1.10	1.10	1.10	1.10	1.10
Toledo, Ohio	1.60	1.70	1.70	1.60	1.60	1.60
Toronto, Ont.	1.55	2.05	2.05	1.90	1.90	1.90
Stone City, Iowa	.75	.....	†1.10	1.05	1.00	.....
Waukesha, Wis.	.90	.90	.90	.90	.90	.....
Wisconsin Points	.50	.....	1.00	.90	.90	.....
SOUTHERN:						
Alderson, W. Va.	.40	1.45	1.35	1.25	1.20	.....
Atlas, Ky.	.50	1.00	1.00	1.00	1.00	1.00
Brooksville, Fla.	.75	.....	2.65	2.65	2.40	2.00
Cartersville, Ga.	1.50	1.50	1.80	1.35	1.15	1.15
Chico, Tex.	1.00	1.35	1.25	1.20	1.10	1.00
El Paso, Tex.	1.00	1.00	1.00	1.00	.....	.....
Ft. Springs, W. Va.	.50	1.35	1.35	1.20	1.20	.....
Graystone, Ala.	.50		Crushed run, screened, $1 per ton			
Kendrick and Santos, Fla.			3½ in. and less, 1.00 per ton			
Ladds, Ga.	.....	1.65	1.65	1.35	1.15	1.15
New Braunfels, Tex.	.60	1.25	1.10	.90	.90	.90
Rocky Point, Va.	.50@ .75	1.40@1.60	1.30@1.40	1.15@1.35	1.10@1.20	1.00@1.05
WESTERN:						
Atchison, Kans.	.50	1.90	1.90	1.90	1.90	1.80
Blue Springs & Wymore, Neb.	.25	1.45	1.45	1.35c	1.25d	1.20
Kansas City, Mo.	1.00	1.60	1.60	1.60	1.60	1.60
Cape Girardeau, Mo.	1.25	1.25	1.25	1.25	1.00	.....

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Branford, Conn.	.80	1.70	1.45	1.20	1.05	.....
Duluth, Minn.	.90	2.25	1.90	1.50	1.35	1.35
Dwight, Calif.	1.00	1.00	1.00	.90	.90	.....
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
Knippa, Texas	2.50	2.00	1.55	1.25	1.15	.....
New Haven, New Britain, Meriden and Wallingford, Conn.	.80	1.70	1.45	1.20	1.05	.....
Northern New Jersey	1.40	2.00	1.80	1.40	1.40	.....
Oakland and El Cerito, Cal.	1.00	1.00	1.00	.90	.90	.....
Richmond, Calif.	.75	.....	1.00	1.00	1.00	.....
San Diego, Calif.	.70	2.00	1.50	.....	1.25	1.25
Springfield, N. J.	2.00	2.00	2.10	1.70	1.70	.....
Toronto, Ont.	.....	3.58@4.05	3.05@3.80	.....	.....	.....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	1.10

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Berlin, Utley, Montello and Red Granite, Wis.—Granite	1.80	1.70	1.50	1.40	1.40	.....
Cayce, S. C.	.....	2.00	1.75	1.75	1.60	.....
Eastern, Penn.—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40
Eastern Penn.—Quartzite	1 20	1.35	1.25	1.20	1.20	1.20
Emathla, Fla.			Crushed flint rock, 2.50 per cu. yd.			
Lithonia, Ga.	.75a	2.00b	1.75	1.40	1.35	1.25
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	1.50	.....
Middlebrook, Mo.	3.00@3.50	.....	2.00@2.25	2.00@2.25	.....	1.25@3.00
Richmond, Calif.—Quartzite	.75	.....	1.00	1.00	1.00	.....
Somerset, Penn. (sand-rock)			1.50 to 1.85			
Toccoa, Ga. (Granite)	.....	1.50	1.40	1.30	1.25	1.25

*Cubic yd. †1 in. and less. ‡Two grades. ‖Rip rap per ton. (a) Sand. (b) to ⅛ in. (c) 1 in., 1.40. (d) 2 in., 1.30 (e) Dust. (f) ¼ in. (h) less 10c discount. (i) 1 in., 1.40.

Agricultural Limestone

(Pulverized)

Alderson, W. Va. — Analysis, 90% $CaCO_3$; 50% thru 50 mesh	1.50
Alton, Ill.—Analysis 99% $CaCO_3$, 0.3% $MgCO_3$; 90% thru 100 mesh	6.00
Asheville, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200-lb. burlap bag, 4.00; bulk	2.75
Atlas, Ky.—90% thru 100 mesh	2.00
50% thru 100 mesh	1.00
Bettendorf and Moline, Ill.—Analysis, $CaCO_3$, 97%; 2% $MgCO_3$; 50% thru 100 mesh, 1.50; 50% thru 4 mesh	1.50
Blackwater, Mo.—100% thru 4 mesh	1.00
Branchton and Osborne, Penn.—100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh. (Less 50 cents commission to dealers)	5.00
Cape Girardeau, Mo.—90% thru 50 mesh	1.50
Charleston, W. Va.—Marl, per ton, bulk	3.00
Chaumont, N. Y.—Pulverized limestone, bags, 4.00; bulk	2.50
Chico, Tex.—50% thru 50 mesh, 1.75; 50% thru 100 mesh	2.25
Colton, Calif.—Analysis 90% $CaCO_3$, bulk	4.00
Cypress, Ill.—90% thru 100 mesh	1.35
Ft. Springs, W. Va.—50% thru 4 mesh	1.50
Hillsville, Penn.—Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$; 75% thru 100 mesh; sacked	5.00
Hot Springs and Greensboro, N. C.—Analysis, $CaCO_3$, 98-99%; $MgCO_3$, 42%; pulverized; 67% thru 200 mesh, bags	3.95
Bulk	2.70
(Paving dust)—80% thru 200 mesh, bags	4.25@ 4.75
Bulk	3.00@ 3.50
Jamesville, N. Y.—Analysis, 89.25% $CaCO_3$; 5.25% $MgCO_3$; pulverized, bags, 4.25; bulk	2.75
Joliet, Ill.—Analysis, $CaCO_3$, 55%; $MgCO_3$, 45%; 90% thru 100 mesh	3.50
Knoxville, Tenn.—80% thru 100 mesh, bags, 3.95; bulk	2.70
80% thru 200 mesh, bags, 4.25; bulk	3.00
Ladds, Ga.—Analysis, $CaCO_3$, 64%; $MgCO_3$, 32%; pulverized; 50% thru 50 mesh	1.50@ 2.75
Marblehead, Ohio—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 70% thru 50 mesh; 100% thru 10 mesh; 80 lb. paper sacks, 5.00; bulk	3.50
Marlbrook, Va.—Marl, per ton, bulk	2.25
Marion, Va. — Analysis, 90% $CaCO_3$, pulverized, per ton	2.00
Middlebury, Vt. — $CaCO_3$, 99.05%; 50% thru 200 mesh; sacked	5.50
Milltown, Ind.—Analysis, 94.50% $CaCO_3$, 33% thru 50 mesh, 40% thru 50 mesh; bulk	1.35@ 1.60
Olive Hill, Ky.—90% thru 4 mesh	1.00
Piqua, Ohio—Total neutralizing power 95.3%; 99% thru 10, 60% thru 50; 50% thru 100	2.50@ 2.75
100% thru 10, 90% thru 50, 80% thru 100; bags, 5.10; bulk	3.60
99% thru 100, 85% thru 200; bags, 7.00; bulk	5.50
Rocky Point, Va.—Analysis, $CaCO_3$, 95%; 50% thru 200 mesh, burlap bags, 3.50; paper, 3.25; bulk	2.00
Syracuse, N. Y. — Analysis, 89% $CaCO_3$; $MgCO_3$, 4%; bags, 4.25; bulk	2.75
Toledo, Ohio, 30% through 50 mesh	2.25
Waukesha, Wis.—90% thru 100 mesh, 4.50; 50% thru 100 mesh, 2.30; 90% thru 50 mesh	1.65
Watertown, N. Y.—Analysis, 96-99% $CaCO_3$; 50% thru 100 mesh; bags, 4.00; bulk	2.50
West Stockbridge, Mass. — Analysis 90% $CaCO_3$, 50% thru 100 mesh; cloth bags, 4.75; paper, 4.25; bulk	3.25

Agricultural Limestone

(Crushed)

Alton, Ill.—Analysis 99% $CaCO_3$, 0.3% $MgCO_3$; 50% thru 4 mesh	3.00
Atlas, Ky.—90% thru 4 mesh	1.00
Bedford, Ind.—Analysis, 98.5% $CaCO_3$, 0.5% $MgCO_3$; 90% thru 10 mesh; 25% thru 100 mesh; 50% thru 50 mesh	1.50
Brandon and Middlebury, Vt.—Pulverized, bags, 5.50; bulk	3.00

(Continued on next page.)

Agricultural Limestone

Bridgeport and Chico, Texas—Analysis, 94% $CaCO_3$, 2% $MgCO_3$; 100% thru 10 mesh	1.75
50% thru 4 mesh	1.50
Chicago, Ill.—50% thru 100 mesh; 90% thru 4 mesh	.80
Columbia, Krause, Valmeyer, Ill.—Analysis, 90% $CaCO_3$; 100% thru 4 mesh	1.10@ 1.50
Cypress, Ill.—90% thru 50 mesh, 50% thru 100 mesh, 90% thru 50 mesh, 90% thru 4 mesh, 50% thru 4 mesh	1.35
Danbury, Conn.—Analysis, 79% $CaCO_3$, 11% $MgCO_3$; 60% thru 100 mesh; 80% thru 50 mesh; 100% thru 4 mesh; bags, 4.25; bulk	3.25
Dundas, Ont.—Analysis, 54% $CaCO_3$; $MgCO_3$, 43%; 50% thru 50 mesh	1.00
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh	1.50
Kansas City, Mo.—50% thru 100 mesh	1.00
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% through 10 mesh; 46% through 60 mesh	2.00
Screenings (¼ in. to dust)	1.00
Marblehead, Ohio.—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$, 32% thru 100 mesh; 51% thru 50 mesh; 83% thru 10 mesh; 100% thru 4 mesh (meal) bulk	1.60
Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 50% thru 50 mesh	1.85@ 2.35
McCook, Ill.—90% thru 4 mesh	.90
Middlepoint, Bellevue, Kenton, Ohio; Monroe, Mich.; Huntington and Bluffton, Ind.—Analysis, 42% $CaCO_3$, 54% $MgCO_3$; meal, 100% thru 4 mesh; 20% thru 100 mesh	1.50
Moline, Ill., and Bettendorf, Iowa—Analysis, 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh	1.50
Mountville, Va.—Analysis, 62.54% $CaCO_3$; $MgCO_3$, 35.94%, 100% thru 20 mesh; 50% thru 100 mesh bags	5.50
Pixley, Mo.—Analysis, 96% $CaCO_3$; 50% thru 50 mesh	1.25
50% thru 100 mesh; 90% thru 50 mesh; 50% thru 50 mesh; 90% thru 4 mesh; 50% thru 4 mesh	1.65
River Rouge, Mich.—Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk	.80@ 1.40
Stone City, Iowa.—Analysis, 98% $CaCO_3$; 50% thru 50 mesh	.75
Tulsa, Okla.—Analysis $CaCO_3$, 86.15%, 1.25% $MgCO_3$, all sizes	1.25

Pulverized Limestone for Coal Operators

Hillsville, Penn., sacks, 4.50; bulk	3.00
Joliet, Ill.—Analysis, 55% $CaCO_3$; 45% $MgCO_3$; 95% thru 100 mesh	3.50
Piqua, Ohio, sacks, 4.50@5.00 bulk	3.00@ 3.50
Rocky Point, Va.—82% thru 200 mesh, 2.50@3.50 bulk, paper bags	3.75@ 4.75
Waukesha, Wis.—90% thru 100 mesh, bulk	4.50

Glass Sand

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

Berkeley Springs, W. Va.	2.00@ 2.25
Buffalo, N. Y.	2.00@ 2.50
Cedarville and S. Vineland, N. J.—Damp	1.75
Dry	2.25
Estill Springs and Sewanee, Tenn.	1.50
Gray Summit and Klondike, Mo.	1.75@ 2.00
Los Angeles, Calif.—Washed	5.00
Mapleton Depot, Penn.	2.00@ 2.25
Massillon, Ohio	3.00
Mendota, Va.	2.25@ 2.50
Michigan City, Ind.	.35
Mineral Ridge and Ohlton, Ohio	2.50
Oceanside, Calif.	3.00
Pittsburgh, Penn.	3.00@ 4.00
Ridgway, Penn.	2.50
Rockwood, Mich.	2.75@ 3.25
Round Top, Md.	2.00
San Francisco, Calif.	4.00@ 5.00
Silica, Va.	2.50
St. Louis, Mo.	2.00
Sewanee, Tenn.	1.50
Thayers, Penn.	2.50
Utica and Ottawa, Ill.	.90@ 1.15
Warwick, Ohio (green)	1.75
Zanesville, Ohio	2.50

Miscellaneous Sands

City or shipping point	Roofing sand	Traction
Beach City, Ohio		1.75
Columbus, Ohio		.15@ .30
Dresden, Ohio		1.25
Eau Claire, Wis.	3.25	1.00
Estill Springs and Sewanee, Tenn.	1.35@ 1.50	1.35@ 1.50

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Ambridge & So. H'g'ts, Penn.	1.25	1.25	1.15	.85	.85	.85
Attica and Franklinville, N. Y.	.75	.75	.75	.75	.75	.75
Boston, Mass.‡	1.40	1.40	2.25		2.25	2.25
Erie, Pa.		1.00*		1.50*	1.75*	
Farmingdale, N. J.	.58	.48	.85	1.20	1.15	
Hartford, Conn.	.65*					
Leeds Junction, Me.		.50	1.75		1.35	1.25
Machias Jct., N. Y.	.75	.75	.85	.75	.75	.75
Montoursville, Penn.	1.00	.85	1.00	.90	.90	.90
Portland, Me.		1.00	2.25		2.00	
Shining Point, Penn.			1.00	1.00	1.00	1.00
Somerset, Penn.		2.00				
South Heights, Penn.	1.25	1.25	.85	.85	.85	.85
Washington, D. C.	.60@ .85	.60@ .85	1.70	1.50	1.30	1.30
York, Penn.	1.10	1.00				
CENTRAL:						
Aurora, Ill.		.40@ .50	.40	.50	.70	.70
Algonquin and Beloit, Wis.	.50	.40	.60	.60	.60	.60
Appleton and Mankato, Minn.		.45	1.25	1.25	1.25	1.25
Attica, Ind.			All sizes .75@.85			
Barton, Wis.		.50	.75	.75	.75	.75
Chicago district, Ill.	.70	.55	.55	.60	.60	.60
Columbus, Ohio		.75	.75	.75	.75	
Des Moines, Iowa	.40	.40	1.40	1.40	1.40	1.40
Eau Claire and Chippewa Falls, Wis.	.40	.40	.80	.90	.90	
Elkhart Lake, Wis.	.40	.40	.56	.56	.50	.50
Ferrysburg, Mich.		.50@ .80	.60@1.00	.60@1.00		.50@1.25
Ft. Dodge, Iowa	.85	.85	2.05	2.05	2.05	2.05
Grand Haven, Mich.		.60@ .80	.70@ .90	.70@ .90		.70@ .90
Grand Rapids, Mich.		.50		.80	.80	.70
Hamilton, Ohio		1.50			1.50	
Hersey, Mich.		.50				.70
Humboldt, Iowa	.50	.50	1.50	1.50	1.50	1.50
Indianapolis, Ind.	.60	.60		.90	.75@1.00	.75@1.00
Joliet, Plainfield and Hammond, Ill.	.60	.50	.50	.60	.60	.60
Mason City, Ia.	.50@ .60	.50@ .60	1.30	1.30	1.20	1.20
Mankato, Minn.		.45	1.25	1.25	1.25	1.25
Mattoon, Ill.	.75@ .85	.60@ .85	.85	.85	.85	.85
Milwaukee, Wis.	.96	.91	1.06	1.06	1.06	1.06
Moline, Ill.	.60@ .85	.60@ .85	1.00@1.20	1.00@1.20	1.00@1.20	1.00@1.20
Northern New Jersey	.50	.50		1.25	1.25	
Pittsburgh, Penn.	1.25	1.25	.85	.85	.85	.85
Silverwood, Ind.	.75	.75	.75	.75	.75	.75
St. Louis, Mo.	.83	1.45	1.55a	1.45	1.45	1.45
Terre Haute, Ind.	.75	.75	.75	.75	.75	
Wolcottville, Ind.	.75	.75	.75	.75	.75	.75
Waukesha, Wis.		.45	.60	.60	.65	.65
Winona, Minn.	.40	.40	1.50	1.25	1.15	1.15
Zanesville, Ohio		.60	.50	.60	.80	
SOUTHERN:						
Charleston, W. Va. (b)			All sand, 1.40. All gravel, 1.40			
Brewster, Fla.	.50@ .60	.50@ .60	2.25			
Chattahoochie River, Fla.		.70		1.75		
Eustis, Fla.		.50@ .60				
Ft. Worth, Texas	2.00	2.00	2.00	2.00	2.00	2.00
Knoxville, Tenn.	1.00	1.20	1.30	1.20	1.20	1.20
Lindsay, Texas					.55	
Macon, Ga.	.50					
New Martinsville, W. Va.	1.00	.90@1.00		1.20@1.30		.80@ .90
Roseland, La.	35	.35	1.25	1.00	.80	.80
WESTERN:						
Kansas City, Mo.		.70				
Los Angeles, Calif. (d)	.50	.50	1.10	1.10		1.10c
Oregon City, Ore.		1.50*	1.50*	1.50*	1.50*	1.50*
Phoenix, Ariz.	1.25*	1.25*	2.50*	2.00*	1.50*	1.25*
Pueblo, Colo.	.80	.60		1.20		1.15
San Diego, Calif.		.75	1.40	1.20	1.00	1.00
Seattle, Wash. (bunkers)	1.25	1.25	1.25	1.25	1.25	1.25

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Algonquin and Beloit, Wis.			Dust to 3 in., .40			
Burnside, Conn.	.75					
Chicago district, Ill.	.35					
Ferrysburg, Mich.						.65@1.00
East Hartford, Ohio	.75*					
Gainesville, Texas		1.00			.55	
Grand Rapids, Mich.				.50		
Hamilton, Ohio					1.00	
Hersey, Mich.				.50		
Indianapolis, Ind.			Mixed gravel for concrete work, at .65			
Joliet, Plainfield and Hammond, Ill.	.35	1.25				
Macon, Ga.	.35@ .50				.90	
Mankato, Minn.	.30					
Moline, Ill. (b)	.60	.60	Concrete gravel, 50% G., 50% S., 1.00			
Ottawa, Oregon, Moronts and Yorkville, Ill.			Ave. .60 per ton all sizes			
Roseland, La.			.35			
Somerset, Penn.		1.85@2.00		1.50@1.75		
St. Louis, Mo.			Mine run gravel, 1.55 per ton			
Summit Grove, Ind.	.50	.50	.50	.50	.50	.54
Winona, Minn.	.40	.40	.60	.60	.60	.60
York, Penn.	1.10	1.06				

(a) ⅝ in. down. (b) River run. (c) 2½ in. and less.
*Cubic yd. †Include freight and bunkerage charges and truck haul. ‡Delivered on job by truck.
(d) Less 10c per ton if paid E.O.M. 10 days. (e) pit run. (f) plus 15c winter loading charge.
(g) ¾-in. and less.

Core and Foundry Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

City or shipping point	Molding, fine	Molding, coarse	Molding, brass	Core	Furnace lining	Sand blast	Stone sawing
Aetna, Ill.				.30@ .35			
Albany, N. Y.	2.00@2.25	2.00	2.00	1.50@2.25	1.50@2.00	1.75@4.50	
Arenzville, Ill.	1.50@1.75			1.00			
Beach City, Ohio	1.75@2.00	1.75@2.00		1.75	2.00		1.75
Buffalo, N. Y.	1.50	1.50		2.00@2.50			
Columbus, Ohio	1.50@2.00	1.25@1.50	2.00	.30	1.75@2.00	2.75@4.50	
Dresden, Ohio	1.50@1.75	1.50	1.75	1.25			
Eau Claire & Chippewa Falls, Wis.						3.00	
Elco, Ill.	Ground silica per ton in carloads—18.00@31.00						
Estill Springs and Sewanee, Tenn.	1.25			1.25		1.35@1.50	
Franklin, Pa.	1.75	1.75		1.75			
Klondike, Mo.	1.75@2.00		1.75@2.00	1.75@2.00	1.75@2.00		1.75
Maplet'n Depot, Pa.	2.00@2.25	2.00		1.90@2.00		2.00	
Massillon, Ohio	2.50	2.50		2.50	2.50		
Mendota, Va.	Ground flint or silex—16.00@20.00 per ton						
Michigan City, Ind.				.30	.30		
Millville, N. J.				1.75b		3.50	
Montoursville, Pa.				1.35@1.50			
New Lexington, O.	2.75	2.25					
Ohlton, Ohio	2.00*	2.00*		2.00*	2.00*	2.50*	2.00*
Ridgway, Pa.	1.50	1.50	1.50@1.75		1.50d		
Round Top, Md.	1.25			1.60		2.25	
San Francisco and Oakland, Calif.	3.50	5.00	3.50	3.50@5.00e	3.50@5.00	3.50@5.00	
Silica, Va.	Potters' flint per ton, 9.00@10.00						
Thayers, Penn.	1.25	1.25		2.00			
Utica, Ill.	.50	.60		.60	.70		
Utica, Penn.	1.75	1.75		2.00			
Warwick, Ohio	*1.75@2.25	*1.75@2.25	*1.75	*1.75@2.25	*1.75@2.25		
Zanesville, Ohio	2.00‡	1.50‡	2.00‡	2.00	2.00		

*Green. †Crude silica, crushed and screened, not washed or dried. ‡Plus 75c per ton for winter loading. ¶Crude. §Crude and dry. (a) Delivered. (b) Damp. (c) Shipped from Albany. (d) Delivered Buffalo or Black Rock. (e) Washed and drained only, 1.50. (f) Dried, screened.

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y., Emporium, Erie and Dubois, Pa.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Eastern Penn.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Northern N. J.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Reading, Penn.	2.50	1.00		1.25			
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio		1.30*	1.80*	1.45*		1.45*	
Jackson, Ohio		1.05*		1.30*	1.05*	1.30*	1.30*
Toledo, Ohio	1.50	1.25	1.25	1.25	1.25	1.25	1.25
Youngst'n, O., dist.	2.00	1.25	1.35	1.35	1.25	1.25	1.25
SOUTHERN:							
Ashland, Ky.		1.55*		1.55*	1.55*	1.55*	1.55*
Ensley and Alabama City, Ala.	2.05	.80	1.35	1.25	.90	.90	.80
Longdale, Roanoke, Ruessens, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.15
Woodward, Ala.	2.05*	.80*	1.35*	1.25*	.90*	.90*	

*5c per ton discount on terms.

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Berkeley, R. I.			12.00					2.15e
Buffalo, N. Y.		12.00	12.00	12.00			10.00	1.95d
Chazy, N. Y.		8.50	7.50	10.00		15.50$_9$	8.50	14.00
Lime Ridge, Penn.							5.00a	
West Stockbridge, Mass.	12.00	10.00	5.60					2.00t
Williamsport, Penn.			10.00				6.00	
York, Penn.		9.50	9.50	10.50	8.50	10.50	8.50	1.65i
CENTRAL:								
Afton, Mich.							8.50	1.35
Carey, Ohio	12.50	8.50	8.00		9.00		8.00	2.00
Cold Springs, Ohio		8.50	8.50				8.00	
Cold Springs and Gibsonburg, Ohio	12.50	8.50	8.50		9.00	11.00		
Frederick, Md.		10.00	10.00	10.00	8.50	10.00	7.00	
Huntington, Ind.	12.50	8.50	8.50		9.00		8.00	
Luckey, Ohio	12.50							
Marblehead, Ohio		8.50	8.50		9.00		8.00	1.50w
Milltown, Ind.		8.50@10.00		10.00p			8.50$_3$	1.35r
Scioto, Ohio	12.50$_{10}$	8.50	8.50	10.00	.62½	7.50	1.50c	1.70d
Sheboygan, Wis.	11.50						9.50	.95
Wisconsin points (f)		11.50					9.50	
Woodville, Ohio	12.50	8.50	8.50	13.50	9.00	11.00$_1$	9.00	1.50c
SOUTHERN:								
Allgood, Ala.	12.50	10.00			8.50		8.50	1.50
El Paso, Texas							7.00	
Graystone & Landmark, Ala.	12.50		9.00	9.00			8.50	1.35
Keystone, Ala.	12.50	9.00	9.00	9.00			8.00	1.35
Knoxville, Tenn.	20.25	9.00	9.00	8.00	1.25e	8.00	1.35	
New Braunfels, Tex.	18.00	12.00	10.00	12.00	10.00		9.50	
Ocala, Fla.		11.00	9.00				11.00	1.50
Saginaw, Ala.	12.50	10.00	9.00	10.00			8.50	1.50
WESTERN:								
Kirtland, N. M.							15.00	
Limestone, Wash.	15.00	15.00	10.00	15.00	16.50	16.50	16.50	2.09
Los Angeles, Calif.	19.00	19.00	14.00		16.20		12.50	2.50
Dittlinger, Tex.		12.00@13.00					9.50p	1.50$_4$
San Francisco, Calif.	21.00	19.00	16.50				14.00	2.00
Tehachapi, Calif.			8.00				13.00z	2.20x
Seattle, Wash.	19.00	19.00	12.00	19.00	19.00		18.60	2.30

†50-lb. paper bags; (a) net ton; (c) wooden, steel 1.70; (d) steel; (e) per 180-lb. barrel; (f) dealers' prices, net 30 days less 25c disc. per ton on hydrated lime and 5c per bbl. on lump if paid in 10 days; (i) 180-lb. net barrel, 1.65; 280-lb. net barrel, 2.65; (p) to 11.00; (q) to 8.75; (r) to 1.50; (s) in 80-lb. burlap sacks; (t) to 3.00; (u) two 90-lb. bags; (v) oil burnt; wood burnt 2.25@2.50; (x) wood. steel 2.30; (z) to 15.00; (*) quoted f.o.b. New York; (‡) paper bags; (w) to 1.50 in two 90-lb. bags, wood bbl. 1.60; (1) to 10.00; ($_1$) 80-lb. paper bags; ($_2$) to 3.00; ($_3$) to 9.00; ($_4$) to 1.60. ($_5$) to 16.00; ($_6$) wood bbl., steel, 1.80; ($_7$) quoted f.o.b. Marble Cliff, Ohio; ($_8$) superfine; ($_9$) barrels. ($_{10}$) f.o.b. Woodville.

Miscellaneous Sands

(Continued)

City or shipping point	Roofing sand	Traction
Mapleton Depot, Penn.		2.00@ 2.25
Massillon, Ohio		2.25
Michigan City, Ind. (Engine sand)		.20@ .30
Mineral Ridge, Ohio	*1.75	*1.75
Montoursville, Penn.		1.00@ 1.10
Ohlton, Ohio	a2.00	a1.75
Red Wing, Minn.		1.25
Round Top, Md.	2.25	1.75
San Francisco, Calif.	3.50	3.50
Thayers, Penn.		2.25
Utica & Ottawa, Ill.	b.90@ 3.50	.90
Warwick, Ohio		2.25
Zanesville, Ohio		2.50

*Wet. †Fine; coarse dry, 3.00@3.50.
(a) Green. (b) Dried, screened.

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Baltimore, Md.:	
Crude talc (mine run)	3.00@ 4.00
Ground talc (20-50 mesh), bags	10.00
Cubes	55.00
Blanks (per lb.)	.08
Pencils and steel worker's crayons, per gross	.08 1.00@ 1.50
Chatsworth, Ga.:	
Crude talc, grinding	5.00
Ground talc (150-200 mesh) bags	10.00
Pencils and steel worker's crayons, per gross	1.00@ 2.50
Chester, Vt.:	
Ground talc (150-200 mesh), bulk	8.00@ 9.00
Including bags	9.00@10.00
Chicago and Joliet, Ill.:	
Ground (150-200 mesh), bags	30.00
Dalton, Ga.:	
Crude talc	5.00
Ground talc (150-200) bags	10.00@12.00
Pencils and steel workers' crayons, per gross	1.00@ 1.50
Emeryville, N. Y.:	
(Double air floated) including bags;	
325 mesh	14.75
200 mesh	13.75
Hailesboro, N. Y.:	
Ground white talc (double and triple air floated) including bags, 300-350 mesh	15.50@20.00
Henry, Va.:	
Crude (mine run)	3.50@ 4.00
Ground talc (150-200 mesh), bulk	8.50@16.00
Joliet, Ill.:	
Roofing talc, bags	12.00
Ground talc (200 mesh), bags	32.00
Keeler, Calif.:	
Ground (200-300 mesh), bags	20.00@30.00
Natural Bridge, N. Y.:	
Ground talc (125-200 mesh), bags	10.00@15.00

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

Gordonsburg, Tenn.—B.P.L. 65-72%..	3.75@ 4.50
Mt. Pleasant, Tenn.—B.P.L. 75%	5.50@ 6.00
Tennessee—F.O.B. mines, gross ton, unground brown rock, B.P.L. 72%	5.00
B.P.L. 75%	6.00
Twomey, Tenn.—B.P.L. 65%, 2000 lb.	8.00@ 9.00

Ground Rock

(2000 lbs.)

Centerville, Tenn.—B.P.L. 65%	8.00
Gordonsburg, Tenn.—B.P.L. 65-70%..	4.00@ 4.50
Mt. Pleasant, Tenn.—B.P.L. 72%	5.00@ 5.50
Twomey, Tenn.—B.P.L. 65%	8.00@ 9.00

Florida Phosphate

(Raw Land Pebble)

(Per Ton.)

Florida—F. O. B. mines, gross ton, 68/66% B.P.L., Basis 68%	3.25
70% min. B.P.L., Basis 70%	3.75

Mica

Prices given are net, F.O.B. plant or nearest shipping point.

Pringle, S. D.—Mine run, per ton	125.00
Punch mica, per lb.	.06
Scrap, per ton, carloads	20.00
Rumney Depot, N. H.—per ton,	
Mine run	360.00
Clean shop scrap	25.00
Mine scrap	22.00
Roofing mica	30.00
Punch mica, per lb.	.12

Cut Mica—50% from Standard List.

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Barton, Wis., f.o.b. cars	.....	10.50
Brandon, Vt.—English pink, English cream and coral pink	*11.00	*11.00
Brandon grey	*11.00	*11.00
Brighton, Tenn.—Pink	6.00	5.00
Mixed pink and bronze	4.50@ 6.00	4.50@ 6.00
All colors, mixed sizes	3.50	3.50
Buckingham, Que.—Buff stucco dash	.....	12.00@14.00
Chicago, Ill. — Stucco chips, in sacks f.o.b. quarries	.....	17.50
Crown Point, N. Y.—Mica spar	.....	9.00@10.00
Dayton, Ohio	.....	6.00@24.00
Easton, Penn., and Phillipsburg, N. J.	.....	12.00@16.00
Haddam, Conn. — Felstone buff	15.00	15.00
Harrisonburg, Va.—Bulk marble (crushed, in bags)	†12.50	†12.50
Ingomar, Ohio — Concrete facings and stucco dash	.....	32.00
Middlebrook, Mo.—Red	.....	20.00@25.00
Middlebury, Vt.—Middlebury white	‡9.00	‡9.00
Middlebury and Brandon, Vt.—Caststone, per ton, including bags	.....	5.50
Milwaukee, Wis.	.....	14.00@34.00
Newark, N. J.—Roofing granules	.....	7.50
New York, N. Y.—Red and yellow Verona	.....	32.00
Red Granite, Wis.	.....	7.50
Stockton, Calif. — "Natrock" roofing grits	.....	12.00@15.00
Tuckahoe, N. Y.—Tuckahoe white	12.00	.....
Wauwatosa, Wis.	.....	20.00@32.00
Wellsville, Colo.—Colorado Travertine Stone	15.00	15.00

†C.L. L.C.L. 17.00.
*C.L. including bags; L.C.L. 14.50
‡C.L. including bags, L.C.L. 10.00.

Potash Feldspar

Auburn and Brunswick, Me.—Color, white; 98% thru 140 mesh bulk	19.00
Buckingham, Que.—Color, white; analysis, K_2O, 12-13%; Na_2O, 1.75%; bulk	9.00
De Kalb Jct., N. Y.—Color, white; bulk (crude)	9.00
East Hartford, Conn.—Color, white, 95% through 60 mesh, bags	16.00
96% thru 150 mesh, bags	28.00
East Liverpool, Ohio—Color, white; 98% thru 200 mesh, bulk	19.35
Soda feldspar, crude, bulk, per ton	22.00
Erwin, Tenn.—Color, white; analysis, 12.07% K_2O, 19.34% Al_2O_3; Na_2O, 2.92%; SiO_2, 64.76%; Fe_2O_3, .36%; 95.50% thru 200 mesh, bags, 16.90; bulk	15.50
Glen Tay Station, Ont., color, red or pink; analysis: K_2O, 12.81%, crude (bulk)	7.00
Keystone, S. D.—Prime white, bulk (crude)	8.00
Los Angeles, Calif. — Color, white; analysis, K_2O, 12.16; Na_2O, 1.53; SiO_2, 65.60; Fe_2O_3, .10; Al_2O_3, 10.20; crude	10.05
Pulverized, 95% thru 200 mesh; bags, 22.00; bulk	20.00
Murphysboro, Ill.—Color, prime white; analysis, K_2O, 12.60%; Na_2O, 2.35%; SiO_2, 63%; Fe_2O_3, .06%; Al_2O_3, 18.20%; 98% thru 200 mesh; bags, 21.00; bulk	20.00
Penland, N. C.—Color, white; crude, bulk	8.00
Ground, bulk	16.50
Spruce Point, N. C., and Bristol, Tenn.—Color, white; 90% thru 200 mesh, bulk	12.50@20.00
Tenn. Mills—Color, white; analysis K_2O, 18%; Na_2O_3, 10%; 68% SiO_2: 99% thru 200 mesh; bulk	18.00
99% thru 140 mesh, bulk	16.00
Topsham, Me.—98% thru 140 mesh, bulk	19.00
Toronto, Can.—Color, flesh; analysis K_2O, 12.75%; Na_2O, 1.96%; crude	7.50@ 8.00

Chicken Grits

Afton Mich. (limestone) per ton	10.00
Belfast and Rockland, Me.—(Limestone), bags, per ton	‡10.00
Brandon and Middlebury, Vt., per ton	10.00
Cartersville, Ga.—(Limestone), per bag	2.00
Centerville, Iowa (gypsum) per ton	18.00
Chico, Texas (limestone), 100 lb. bags, per ton	8.00@ 9.00
Danbury, Conn. (limestone), bulk	6.00@ 7.00
Easton, Penn.—Per ton, bulk	3.00
Joliet, Ill.—(Limestone), bags, per ton	4.50
Knoxville, Tenn.—per bag	1.25
Los Angeles, Calif. (feldspar) per ton	15.00
Gypsum, Ohio.—(Gypsum) per ton	10.00
Limestone, Wash. (limestone) per ton	12.50
Marion, Va.—(Limestone), bulk, 5.00; bagged, 6.50; 100-lb. bag	.50
Rocky Point, Va. (limestone) 100 lb. bags, 50c; sacks, per ton, 6.00 bulk	5.00
Seattle, Wash.—(Limestone), bulk, per ton	12.00
Warren, N. H.—(Mica) per ton	3.85@ 3.90
Waukesha, Wis.—(Limestone), per ton	8.00
West Stockbridge, Mass.—(Limestone) bulk	‡7.50@*9.00
Wisconsin Points (limestone) per ton	9.00

*L.C.L. †Less than 5-ton lots. ‡C.L.

Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

Albany, N. Y.	10.00
Anaheim, Calif.	10.50@11.00
Barton, Wis.	10.50@13.00b
Boston, Mass.	*17.00
Brighton, N. Y.	*19.75
Brownstone, Penn.	11.00
Dayton, Ohio	12.00@13.50
Detroit, Mich.	‡15.00
Farmington, Conn.	13.00
Flint, Mich.	¶12.00@17.50*
Grand Rapids, Mich.	12.00
Hartford, Conn.	*18.50
Jackson, Mich.	12.25
Lakeland, Fla.	10.00@11.00
Lake Helen, Fla.	9.00@15.00
Lancaster, N. Y.	12.50
Madison, Wis.	a12.50
Michigan City, Ind.	11.00
Milwaukee, Wis.	*13.00
Minneapolis and St. Paul, Minn.	10.00
Minnesota Transfer	10.00
New Brighton, Minn.	10.00
Pontiac, Mich.	14.50
Portage, Wis.	16.00
Prairie du Chien, Wis.	18.00@22.50
Rochester, N. Y.	*19.75
Saginaw, Mich.	13.00
San Antonio, Texas	16.00
Sebewaing, Mich.	12.00
Sioux Falls, S. Dak.	13.00c
South River, N. J.	14.00
Syracuse, N. Y.	18.00@20.00*
Toronto, Canada	13.50
Wilkinson, Fla.	10.00@12.00
Winnipeg, Canada	*15.00

*Delivered on job. †Delivered in city. ‡Less 5%. ¶Dealers' price. (a) Less .50 E.O.M. 10 days. (b) Delivered to Milwaukee. (c) Delivered at yard.

Portland Cement

Prices per bag and per bbl, without bags net in carload lots.

	Per Bag	Per Bbl.
Albuquerque, N. M.	.86¼	3.47
Atlanta, Ga.	.....	2.35
Baltimore, Md.	.....	2.25
Birmingham, Ala.	.....	2.30
Boston, Mass.	.55¾	2.23
Buffalo, N. Y.	.57½	2.30
Butte, Mont.	.90¼	3.61
Cedar Rapids, Iowa	.....	2.24
Charleston, S. C.	.....	2.35
Cheyenne, Wyo.	.82¾	3.31
Cincinnati, Ohio	.....	2.32
Cleveland, Ohio	.....	2.24
Chicago, Ill.	.....	2.05
Columbus, Ohio	.....	2.29
Concrete, Wash.	.....	2.35
Dallas, Texas	.....	2.00
Davenport, Iowa	.....	2.24
Dayton, Ohio	.....	2.33
Denver, Colo.	.66¼	2.65
Detroit, Mich.	.48¾	1.95
Duluth, Minn.	.....	2.04
Houston, Texas	.....	2.00
Indianapolis, Ind.	.....	2.19
Jackson, Miss.	.....	2.50
Jacksonville, Fla.	.....	2.20
Jersey City, N. J.	.....	2.13
Kansas City, Mo.	.....	1.92
Los Angeles, Calif.	.59½	2.38
Louisville, Ky.	.54¼	.....
Memphis, Tenn.	.....	2.50
Milwaukee, Wis.	.....	2.10
Minneapolis, Minn.	.....	2.12
Montreal, Que.	.....	1.36
New Orleans, La.	.....	2.20
New York, N. Y.	.50¾	2.03
Norfolk, Va.	.....	2.17
Oklahoma City, Okla.	.....	2.46
Omaha, Neb.	.....	2.36
Peoria, Ill.	.....	2.22
Philadelphia, Penn.	.....	2.11
Phoenix, Ariz.	.81½	3.26
Pittsburgh, Penn.	.....	2.04
Portland, Colo.	.....	2.80
Portland, Ore.	.67½	2.50@2.70
Reno, Nev.	.75¼	3.01
Richmond, Va.	.....	2.40
Salt Lake, Utah	.70¼	2.81
San Francisco, Calif.	.57¾	2.31
Savannah, Ga.	.....	2.50
St. Louis, Mo.	.....	2.05
St. Paul, Minn.	.....	2.12
Seattle, Wash.	.....	2.50*
Tampa, Fla.	.....	2.25
Toledo, Ohio	.....	2.20
Topeka, Kans.	.....	2.41
Tulsa, Okla.	.....	2.33
Wheeling, W. Va.	.....	2.12
Winston-Salem, N. C.	.....	2.78

NOTE—Add 40c per bbl. for bags.
†Delivered on job in any quantity, sacks extra.
‡Less 5c bbl. 10 days.
*Ten cents discount for cash, 10 days. (a) Price includes sacks.

Mill prices f.o.b. in carload lots, without bags, to contractors.

	Per Bag	Per Bbl.
Buffington, Ind.	.....	1.80
Chattanooga, Tenn.	.....	2.45*
Concrete, Wash.	.....	2.35
Davenport, Calif.	.....	2.05
Detroit, Mich.	.....	2.15
Hannibal, Mo.	.....	1.90
Hudson, N. Y.	.....	1.75
Leeds, Ala.	.....	1.85
Mildred, Kans.	.....	2.35
Nazareth, Penn.	.....	1.95
Northampton, Penn.	.....	1.75
Richard City, Tenn.	.....	2.05
Steelton, Minn.	.....	1.85
Toledo, Ohio	.....	2.20
Universal, Penn.	.....	1.80

*Including sacks at 10c each.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gauging Plaster	Wood Fiber	White Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	—Plaster Board— ⅜x32x 36". Wt. 1500 lb. Per M Sq. Ft.	—Plaster Board— ½x32x 36". Wt. 1850 lb. Per M Sq. Ft.	Wallboard, ⅜x32 or 48". Lgths. 6'-10', 1850 lb. Per M Sq. Ft.
Arden, Nev. and Los Angeles, Calif.	3.00	8.00u	8.00u	10.70u	10.70u	.....	.....	.....	.....	11.70u	.....	.....	
Centerville, Iowa	3.00	10.00	15.00	10.00	10.00	10.50	13.50	.....	.....	13.50	.....	.....	
Des Moines, Ia.	3.00	8.00	9.00	10.00	10.00	10.50	13.50	12.00	24.00	22.00	18.00	21.00	30.00
Detroit, Mich.	.....	.....	.....	.....	14.30o	12.30m	.....	m9.00@11.00o	.....	.....	.....	.....	.....
Delawanna, N. J.	——	——	——	——	——	8.00	.....	8.25@9.40	.....	.....	.14½s	.15½s	40.00@41.00
Douglas, Ariz.	.....	.....	6.00	.....	.....	.....	15.00	.....	40.00	13.50	35.00	45.00	.....
Grand Rapids, Mich.	2.75	6.00	6.00	8.00	9.00	9.00	17.50	.....	24.55	20.00	.....	.....	.....
Gypsum, Ohio	3.00	4.00	6.00	8.00	9.00	9.00	20.00	7.00	27.00	19.00	.....	15.00	30.00
Los Angeles, Calif.	.....	.....	7.50@9.50	11.50y	.....	.....	.....	.....	.....	.....	.....	.....	.....
Port Clinton, Ohio	3.00	4.00	6.00	10.00	9.00	9.00	21.00	7.00	30.15	20.00	.....	20.00	30.00
Portland, Colo.	.....	.....	.....	10.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Francisco, Calif.	.....	.....	11.65m	13.40r	14.40r	.....	15.40r	.....	.....	.....	.....	.....	.....
Seattle, Wash.	6.40	11.00	11.00	13.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sigurd, Utah	.....	.....	.....	.....	.....	.....	.....	.....	21.50	——	.....	.....	.....
Winnipeg, Man.	5.00	5.00	7.00	13.00	14.00	14.00	.....	.....	.....	.....	20.00	25.00	33.00

NOTE—Returnable bags, 10c each: paper bags, 1.00 per ton extra (not returnable).
*To 3.00; †to 11.00; ¶to 12.00; ‡prices per net ton. sacks extra: (a) to 25.00: (b) net; (c) gross; (d) hair fibre; (f) delivered; (h) delivered in six states; (i) delivered on job; (k) sacks 12c extra, rebated; (m) includes paper bags; (o) includes jute sacks; (r) including sacks at 15c; (s) per board; (t) to 16.50; (u) includes sacks; (v) F.O.B. N. Y. C. and dealer's yard in mill locality; (x) Hardwall plaster; (y) sacks 15c extra, rebated.

Market Prices of Cement Products

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point

City of shipping point	Sizes 8x8x16	8x10x16	8x12x16
Camden, N. J.	17.00	.....	.....
Cement City, Mich.		5x8x12—55.00¶	
Columbus, Ohio	.16@.18a	.....	.....
Detroit, Mich.	.16	.....	.18
Forest Park, Ill.	18.00*	23.00*	30.00*
Grand Rapids, Mich.	15.00@16.00a	.....	.....
Graettinger, Iowa	.18@.20	.....	.....
Indianapolis, Ind.	.13@.15†	.....	.....
Los Angeles, Calif.¶	5¼x3½x12—55.00	7¼x3½x12—65.00	
Oak Park, Ill.	18.00	.....	.....
Olivia and Mankato, Minn.	9.50b	.....	.....
Somerset, Penn.	.20@.25	.....	.....
Tiskilwa, Ill.	.16@.18†	.....	.....
Yakima, Wash.	20.00*	.....	.....

*Price per 100 at plant. †Rock or panel face. (a) Face. ‡Delivered. ¶Price per 1000. (b) Per ton.

Cement Roofing Tile

Prices are net per sq. in carload lots, f.o.b. nearest shipping point unless otherwise stated.

Camden and Trenton, N. J.—8x12, per sq.	
Red	15.00
Green	18.00
Chicago, Ill.—per sq.	20.00

Cicero, Ill.—Hawthorne roofing tile, per sq.

	Chocolate, Red, Yellow, Gray and Orange	Green, Blue
French and Spanish†	$11.50	$13.50
Ridges (each)	.25	.35
Hips	.25	.35
Hip starters	.50	.60
Hip terminals, 2-way	1.25	1.50
Hip terminals, 4-way	4.00	5.00
Mansard terminals	2.50	3.00
Gable finials	1.25	1.50
Gable starters	.25	.35
Gable finishers	.25	.35
*End bands	.25	.35
*Eave closers	.06	.08
*Ridge closers	.05	.06

*Used only with Spanish tile.
†Price per square.

Houston, Texas.—Roofing Tile, per sq.	25.00
Indianapolis, Ind.—9x15-in.	Per sq.
Gray	10.00
Red	11.00
Green	13.00
Waco, Texas:	Per sq.
4x4	.60

Cement Building Tile

Grand Rapids, Mich.	Per 100
5x8x12	8.00
5x4x12	4.50
5x8x12	8.00
Longview, Wash.	Per 1000
4x6x12	52.00
4x8x12	64.00
Mt. Pleasant, N. Y.:	Per 1000
5x8x12	78.00
Grand Rapids, Mich.:	Per 100
5x8x12	7.00
Houston, Texas:	
5x8x12 (Lightweight)	80.00
Pasadena, Calif. (Stone-Tile)	Per 100
3½x4x12	3.00
3½x6x12	4.00
3½x8x12	5.50
Tiskilwa, Ill.—8x8, per 100	15.00
Wildasin Spur, Los Angeles, Calif. (Stone-Tile)	Per 1000
3½x6x12	50.00
3½x8x12	60.00
Prairie du Chien, Wis.:	
5x8x12	82.00
5x4x12	46.00
5x8x 6 (half-tile)	41.00
5x8x10 (fractional)	82.00
Yakima, Wash.—Building tile:	
5x8x12	.10

Cement Drain Tile

Graettinger, Iowa—5 to 36 in., per ton	8.00
Olivia and Mankato, Minn.—Cement drain tile, per ton	8.00
Tacoma, Wash.—Drain tile per ft.:	
3 in.	.04
4 in.	.05
6 in.	.07½
8 in.	.10
Waukesha, Wis.—Drain tile, per ton	8.00

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	25.00@40.00
Baltimore, Md. (Del. according to quantity)	15.50	22.00@50.00
Camden and Trenton, N. J.	17.00	
Ensley, Ala. ("Slagtex")	14.50	22.50@33.50
Eugene, Ore.	25.00	35.00@75.00
Friesland, Wis.	22.00	32.00
Longview, Wash.	18.00	25.00@75.00
Milwaukee, Wis.	15.00	28.00@50.00
Mt. Pleasant, N. Y.		14.00@23.00
Oak Park, Ill.	25.00	a42.00
Omaha, Neb.	18.00	30.00@40.00
Pasadena, Calif.	10.00	
Philadelphia, Penn.	14.75	20.00
Portland, Ore.	17.50	25.00@75.00
Mantel brick—100.00@150.00		
Prairie du Chien, Wis.	14.00	22.50@25.00
Rapid City, S. D.	18.00	25.00@80.00
Waco, Texas	16.50	32.50@125.00
Watertown, N. Y.	20.00	35.00
Westmoreland Wharves, Penn.	14.75	20.00
Winnipeg, Man.	14.00	22.00
Yakima, Wash.	22.50	

†Gray. ‡Red. (a) Haydenite H. Brick.

Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted.

Culvert and Sewer	4 in.	6 in.	8 in.	10 in.	12 in.	15 in.	18 in.	20 in.	22 in.	24 in.	27 in.	30 in.	36 in.	42 in.	48 in.	54 in.	60 in
Detroit, Mich.								15.00 per ton									
Graettinger, Iowa	.04½d	.05½	.08½	.12½	.17½	—	.40	.50	.60	.70	—	—	—	—	—	—	—
G'd Rapids, Mich. (b)																	
Culvert pipe	.....	.....	.....	.60	.72	1.00	1.28	1.60†	.....	1.92	2.32	3.00	4.00	5.00	6.00	.....	.....
Sewer pipe (d)	.....	.....	.....	.....	.....	.63	.....	.60†	.....	.....	.....	.58	.....	.....	.....	.....	.....
Houston, Texas	.....	.19	.28	.43	.55½	.90	1.30	.....	†1.70	2.20	.....	.....	.....	.....	.....	.....	—
Indianapolis, Ind. (a)	.....	.....	.....	.80	.90	1.10	1.30	.....	.....	1.70	.....	2.70	.....	.....	.....	.....	—
Longview, Wash.							Sewer pipe 40% off list, culvert—list										
Mankato, Minn. (b)	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.50	1.75	2.50	3.25	4.25	.....	.....	—
Newark, N. J.								6 in. to 24 in., $18.00 per ton									
Norfolk, Neb. (b)	.....	.....	.....	.90	1.00	1.13	1.42	.....	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Olivia, Mankato, Minn.								12.00 per ton									
Paullina, Iowa‡	.....	.....	.....	.....	.....	.....	.....	2.25	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Somerset, Penn.	.....	.....	.....	.....	1.08	1.25	1.65	.....	.....	2.50	.....	3.65	4.85	7.50	8.50	.....	—
Tacoma, Wash.	.15	.18	.22½	.30	.40	.55	.75	.....	.....	.....	.....	.....	.....	.....	.....	.....	—
Tiskilwa, Ill. (rein.) (a)	.....	.....	.....	.65	.75	.85	1.10	1.60	.....	1.90	.....	2.25	3.40	.....	5.50	.....	—
Wahoo, Neb. (b)	.....	.....	.....	.....	1.00	1.13	1.42	.....	.....	2.11	.....	2.75	3.58	4.62	6.14	6.96	7.78
Yakima, Wash.								$10.00 per ton									

30-in. lengths up to 27-in. diam., 48-in. lengths after; (a) 24-in. lengths; (b) Reinforced; (c) Interlocking bar reinforced. (d) Eastern clay, list, 72% and 60% off.

†21-in. diam. ‡Price per 2 ft. length. (d) 5 in. diam. [1]@1.08 [2]@1.25. [3]@1.65. [4]@2.50. [5]@3.85. [6]@5.00. [7]@7.50.

Recent Contract Prices on Rock Products

THE following are some of the recent prices received through bid or offerings for various rock products:

Penglase Engineering Co.—94c per cu. yd. for 1500 yd. or more of Wabash river gravel to be unloaded at New Harmony, Ind.

Wisconsin State Highway Department—Cement at $2 per bbl. offered to city of Milwaukee. Total to be used about 20,000 bbl. Local dealers price $2.41 per bbl. delivered to designated points.—*Milwaukee* (Wis.) *Journal.*

Lime, Ore.—Agricultural limestone offered at $4.75 ton, bulk, and $5.50 sacked.

Construction Contracts in March Establish New Record

CONSTRUCTION contracts to the amount of $620,738,200 were awarded in March in the 37 states east of the Rocky Mountains, according to F. W. Dodge Corp. This tops the previous high record of August, 1925, by $9,000,000. The increase over March, 1926, was nearly 4% and the increase over February of this year was 57%.

The March record brought the contract total for the first quarter of this year up to $1,398,776,100, which is only about 4½% below the figure for the corresponding period of last year. At the end of January this year was 16% behind last year; at the end of February, 10% behind; at the end of March, only 4½% behind. This shows that there was in March a quite considerable recovery from the low contract volumes of the preceding two months.

Last month's record included the following important items: $250,078,300, or 40% of all construction, for residential buildings; $113,766,000, or 18%, for commercial buildings; $106,826,900, or 17%, for public works and utilities; $48,076,600, or 8%, for industrial buildings, and $36,521,800, or 6%, for educational buildings.

Contemplated new construction was reported in March to the amount of $1,198,090,900, an increase of 16% over March, 1926. This record total of contemplated work indicates an upturn in construction demand. A 6% increase in April over the March volume will establish a new four months record.

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

Making Quality the First Consideration

Czarra and Constantine Co., Inc., Have Built Up a Large Business by Making a Better Block

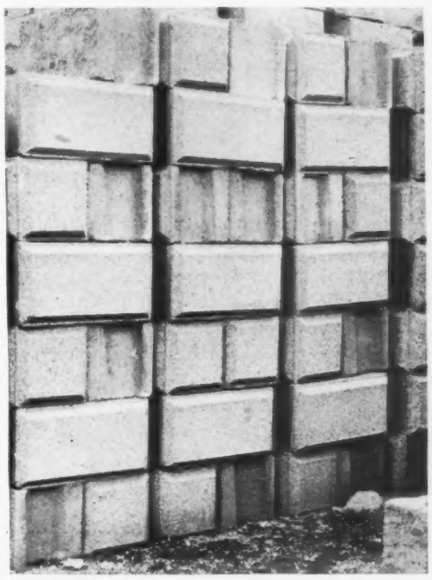
THE business of the Czarra and Constantine Co., Inc., of Brentwood, Md., began four years ago with a hand machine from a mail order house. Now the concern runs two face-down machines, two strippers and a tile machine (all of Anchor make) in about as neat and well designed a plant as can be found anywhere. The original plant building served first as an office and then as an oil storehouse, and now it can hardly be seen among the buildings that surround it. This growth has been accomplished by sticking to one idea, that of quality. Although the business has been efficiently and economically conducted, the guiding principle of the business was not so much to reduce costs or to increase output as it was to make a better block all the time.

The development of the concrete masonry unit business has been very rapid and it has also developed along two lines. One line has been that of quantity, that of increasing production by introducing labor-saving devices, using improved machines as fast as they come out and "cutting corners" wherever possible. The other has been to make a better block by studying the aggregates available, the water-cement ratio, time of mixing, machine work and curing in great detail, and adopting only those methods that improved the quality of the block even though they cost a little more than some others. Both lines of development were necessary and both have been successful, but in the operation about to be described the quality line of development has been more than usually successful.

Brentwood is near Washington, D. C., and the products plants in that locality use sand very largely for making block and tile. Pebbles are available but are considered too high priced to justify their use in view of the saving of cement that would be secured. Besides, the trade is used to the smooth-appearing sand block. While there are a number of plants that make a good block with sand, there are (as in every district) some of the other kind. In the face of competition of the other kind, a block which has the requisite strength and which is thoroughly cured will win every time, as has been repeatedly proven in all parts of the United States.

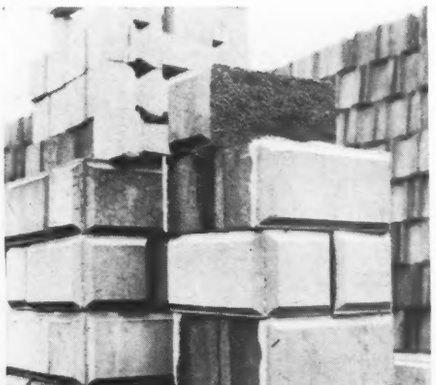
The Czarra and Constantine Co. makes and sells some block in which only sand is used as an aggregate, but the main part of the production is a block made of limestone screenings. These they bring by truck from Martinsburg, Va., where they are bought from the Blair Limestone Co. One has only to lift the two blocks to see the difference in them. The limestone screenings block is much heavier, showing that it is of denser and stronger concrete with a much lower absorption. The limestone screenings block is so strong that (according to Mr. Constantine) in a recent shipment of 8000 to one of the jobs which the firm was erecting only three blocks were broken and they were broken by the masons who tried to cut them.

A little sand is used with the limestone screenings as it has been found that this improves the grading and makes a stronger



Some of the special panel-faced block featured by the company. This is faced with crushed spar

Czarra and Constantine Co., Inc., cement block plant near Washington, D. C. Three years ago operations were carried on in a small shed with a hand machine



White panel-faced block. The facing is of silica sand and white cement

and less absorptive block than screenings alone.

Aggregates are all received by truck, the trucks backing into the plant and dumping the loads near the mixer. The aggregates are measured into the mixer (a No. 2 Blystone) by shoveling into a wheelbarrow. This part of the operation, it was admitted, could be improved and it is probable that an elevator and bins may be added. At present the wheelbarrow has to be pushed up an incline to a platform over the mixer. But as it is, two men can attend to the mixer and keep four machines supplied. These men do not work as mixer man and helper but spell each other at intervals so that one does not have all the heavy work to do. Cement is stored in a dry room built of concrete block near the mixer. The mix is long and the water content is such that web marks show on the faces of the block.

The machine work differs from that of many other plants in that no off-bearer is employed. One man fills the mold, makes the block and then puts it on the rack. Working in this way the output runs about 500 block per man and machine for a 9-hr. day. In one instance where the demand was pressing, a man made 751 block before quitting, but the usual run is about 500. The one-man system has been found to produce a more uniform quality.

Iron pallets are largely used. It was found that wooden pallets lasted two years before they had to be discarded but in the latter part of this life they did not make so good a block. Iron pallets costing 45c each, last indefinitely and make as good a block at one time as another. As wooden pallets cost 12c each, the difference in cost is soon made up by the longer life of the iron pallet, to say nothing of the better product obtained.

The tile machine is in a separate building and a somewhat different system is employed. The mixer (Blystone) is set below the ground level so that it may be easily filled with aggregate and cement. An inclined bucket elevator runs from below the mixer to the hopper of the machine. Two men work on this machine and produce 1500 tile a day. The tile are of the well-known "Hightest" pattern.

All block and tile are handled to the curing room, and from the curing room to the yard by "Jacklifts" made by Shepard and Lewis Co. The trucks for handling green tile have rubber tires, the truck body setting on spiral springs. This minimizes vibration in a very satisfactory way. The floor of the plant is of concrete and is kept clean to obviate jarring the trucks loaded with green tile. Trucks with steel tires are used in the yard as the cured tile cannot be injured by ordinary vibration.

The curing system is unique in the writer's observation in that the curing rooms are heated with a hot water system instead of the usual steam pipes. This is regulated to keep a temperature of 100 deg. F. in the room at all times. Fog nozzles are used to keep the air in the room at the proper moisture content. Each curing room has a thermometer placed where it can be seen through a small window and the whole interior is lighted to permit observation through this window.

The curing is rather slow as this has been found to give a somewhat stronger block than fast curing at a higher temperature. The blocks are always kept at least 24 hr. in the curing room.

There are six curing rooms each 45 ft.

Rubber tired trucks with springs are used to handle green block

long and 6 ft. wide. A thin man can just get past a loaded truck, and Mr. Constantine says that it would be advantageous to build the rooms a little wider. The walls are of concrete tile and the roof of reinforced concrete. Each room holds five racks.

After removal from the curing rooms, the blocks are thoroughly cured in the yard before being placed in the wall. The company does a great deal of construction, finding it better to do this in order to be cer-

Company office building constructed of granite faced block

The company takes orders for complete residences of this type

tain of the workmanship. And it does not want to lay green block with the consequent danger of shrinkage.

In and around Washington a great many faced blocks are used and this company rather specializes on a panel-faced block with a facing of Crown Point spar. The panel block is carefully made and has to be laid with somewhat more care than the rock-face, but a very pretty building is the result. An increase of 2 cents per block is charged for this panel-face over the rock-face.

Considerable experimenting with facings has been carried on. Blocks made with crushed and screened granite have a natural appearance but are dull looking. Crown Point spar has a brighter appearance and a very good result has been obtained with a mixture of crushed marble and black slag in proper proportions.

Another handsome panel-faced block is made with a facing of Atlas white cement and a pure white silica sand bought in New Jersey. Specimens of this block exposed to the weather for a year and a half showed no signs of crazing, a defect often found in blocks of this kind. Crazing is prevented by having the mix of the proper proportions and by proper curing. Attempts to make blocks with a facing of sea sand gave poor results, all of them crazing badly so this type of facing was abandoned.

Trim stone is not made in large quantity as yet but this part of the business is expected to increase.

Cast Stone Manufacturers to Standardize Product

THE Associated Art Stone Manufacturers has been formed to present a standard specification for architectural cast stone with the view of controlling the uniformity and quality of the product, it was announced recently in the *Los Angeles* (Calif.) *Times*.

The new specification will be put into effect shortly, and architects who avail themselves of its use will automatically put the art stone and the manufacturer under rigid inspection by a recognized testing laboratory, according to Frank M. Brooks, president. Certified tests of materials and inspection of workmanship will be reported for each job and the plan will practically guarantee a high quality of uniform stone, he said.

The following firms are members of the association: California Staff and Stone Co., Henry Decorative Stone Co., Mission Staff and Stone Co., Kendall and Delaney, Watkins Co., all of Los Angeles, and Brooks Art Stone Corp. of Pasadena.

Pacific Portland Adding Second Unit to Redwood City Mill

CONSTRUCTION work on the new unit to the Redwood City, Calif., mill of the Pacific Portland Cement Co. is being pushed rapidly to completion.

The foundation of the second section of the mill is now complete, and the forms have been prepared for the bases which will support the cement mill machinery. Excavations are being made at present for the foundation for the stock storage bins to be used with the new section of the plant.

The plant at Redwood City was placed in operation about two and a half years ago. It was described in ROCK PRODUCTS, May 15, 1926, issue. Later two plants for the manufacture of agricultural limestone and ground shell were added.

Speaking of the local plant recently, an official of the company said:

"In view of the satisfactory operation of the plant, low cost of manufacture, ample supply of raw materials, favorable location as to rail and deep water transportation and close proximity to large consuming markets, we consider it very unwise to defer increasing the capacity of the Redwood City plant." —*Redwood City* (Calif.) *Gazette*.

Wilson Sand & Supply Co. and Ashland Sand & Gravel Co. Merge

ANNOUNCEMENT is made in the Huntington, (W. Va.) *Advertiser* of the consolidation of the Wilson Sand & Supply Co., of Huntington, and the Ashland Sand and Gravel Co., of Ashland. The new firm will be known as the Ohio River Dredging Co., and will maintain headquarters in the former offices of the Wilson Sand & Supply Co., at Twentieth street and river front.

At a meeting of the officials of the two companies, E. V. Rawn, vice-president and general manager of the Wilson Sand & Supply Co., was chosen president of the new company. Mr. Rawn was formerly chief engineer with the Bonair Coal and Iron Corp., of Nashville, Tenn.

Other officials chosen were A. B. Rawn, vice-president; J. C. McLester, second vice-president; C. W. Sams, treasurer, and G. A. Northcott and W. P. Wheeler, of Ashland, directors. P. T. Burdette was named production manager for the new company.

Mr. Rawn explained that the consolidation of the two companies follows the tendency in all business to consolidate for economic reasons, due to the growth of towns and longer river tows being made necessary.

Monolith Company to Build Wyoming Cement Plant

THE long rumored Wyoming cement plant will soon be an actuality, according to several reports published in various newspapers, all purporting to be official announcements of the inauguration of the Monolith Portland Midwest Co., with large holdings of cement raw material near Laramie, Wyo., where a new 400,000-bbl. cement mill will be erected. The Monolith Midwest, it is stated, is a separate corporation directed by the same officers as the Monolith Portland Cement Co., Los Angeles, Calif. The new Wyoming plant is said to be part of an expansion program of the Monolith company that will enable distribution over a larger territory in the intermountain states as well as in the Pacific coast regions. The Wyoming, Colorado and Nebraska territory which will be serviced by the new plant had a total cement consumption of over 1,300,000 bbl. in the past year, it is said. Coy Burnett, president of both companies, states that the highway, irrigation and other projects in construction forecast in the new few years will offer a good market for the products of the new plant.

Stockholders of the Monolith company were recently given purchase rights in the new company, and these rights having expired a small portion of stock is now being offered for public subscription. The Monolith Portland Midwest Co. has established offices in Los Angeles, San Francisco, Oakland, San Diego and San Jose.

Officers and directors of the two companies include Coy Burnett, president; Wilmar Evans, vice-president and general manager; J. J. Calkins, secretary and treasurer; W. S. Trueblood, general superintendent in charge of operations at the Monolith mills; C. A. Low, director of sales, and Tom Larson, traffic and assistant sales manager.

Curing of Concrete Block

THE EDITOR:

I WOULD like to suggest a constructive criticism that the concrete products industry has suffered through a great volume of misinformation that has been put out and I regret to note that there are several misleading statements in the report of the paper which I presented at the American Concrete Institute.

For example, this article refers to the fact that green blocks might be caused to sag by too much moisture in the curing room and this reference is followed by the statement that ventilation should be provided to prevent this. As a matter of fact draft and air currents are to be guarded against in the curing of any concrete products and the reference made to ventilation in the writer's paper referred to the question of ventilation in the main working rooms of the plant and not in the curing room.

AUSTIN CRABBS,
Cement Products Co., Davenport, Iowa.

Fuller's Earth in 1925

THE Bureau of Mines, Department of Commerce, has just released the finally revised summary of total production of stone sold or used in the United States during 1925. According to the data contained therein, all varieties quarried increased in both quantity and value over the preceding year. The preliminary report preceding this was published in detail in ROCK PRODUCTS, August 7, 1926, issue and contains the same information in curtailed form.

How Any Aggregate Producer May Deliver Ready-Mixed Concrete!

OUT of the far West, where much that is new in construction ideas has originated, comes a new one that will greatly interest sand, gravel and crushed-stone producers, who constitute a large share of ROCK PRODUCTS readers. It is a combined motor truck and concrete mixer, which, if it is all that its advocates claim, will make central mixing plants for concrete a back number.

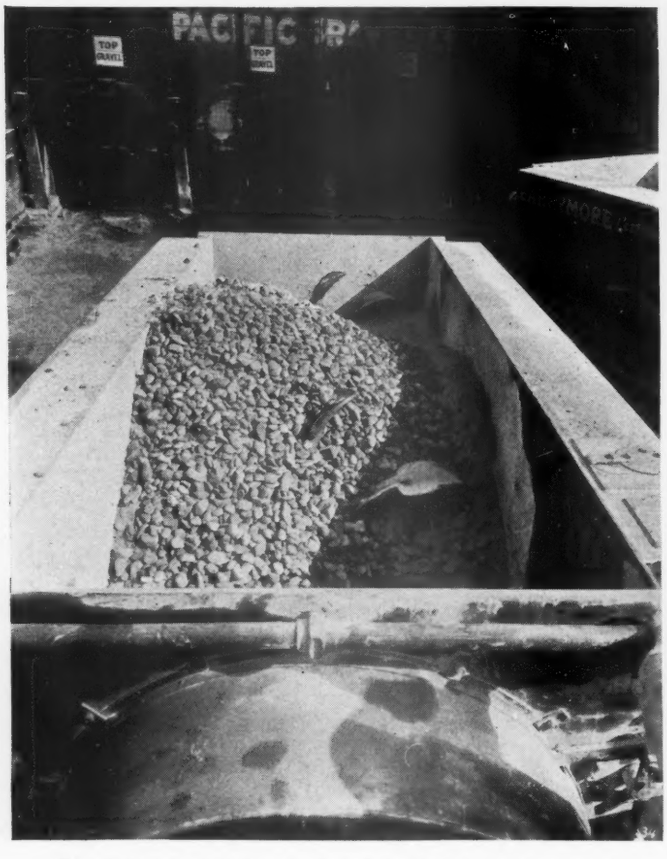
The Barrymore concrete mixer is an "open-top" super-mixer of scientific design built to fit on the chassis of all standard, popular trucks. Barrymore concrete mixers are constructed in 1-, 1¾- and 2½-cu. yd. capacities.

The same power that drives the truck now is applied to mix the pre-measured load of cement, aggregates and water *at the job!* (Water is in a separate tank, until released in mixing.)

This concrete mixer eliminates concrete mixing by the contractor at the job or a central mixing plant operated by the aggregate producer, but provides the scientific plan of mechanical measuring at a central bunker where aggregate specifications can be accurately followed.

Under the bunker, the prescribed batch is dumped into the "open-top" body. Also, the exact amount of water is run into the separate tank on the truck body. Then the driver takes his *dry batch* to the job, no matter how far away. In two or three minutes, *at the job*, he mixes and quickly dumps

Truck under batcher to receive proportioned batch



The batch in position in the truck body. Water is in the tanks at the sides

The batch after a wet mix and ready for dumping. Note the peculiar curved mixing blades

a mixed batch—and drives away to the materials yard for another load.

The manufacture and development of the Barrymore concrete mixer sounds a new era in the life of the sand and gravel producer and distributor. It puts him into a new line of business without a big plant investment. No longer is he a seller of raw material alone, but may also be the manufacturer of a finished product, a quality super-mixed concrete, which is sold either on the basis of strength, or on the basis of mix.

The Barrymore concrete mixer is based on the principles that scientific measurement of cement and aggregates can be secured only through mechanical measuring at a central bunker; that these aggregates should be mixed in the truck, using its own power, and not previous to the time the concrete is required at the point of utilization.

Simple Design

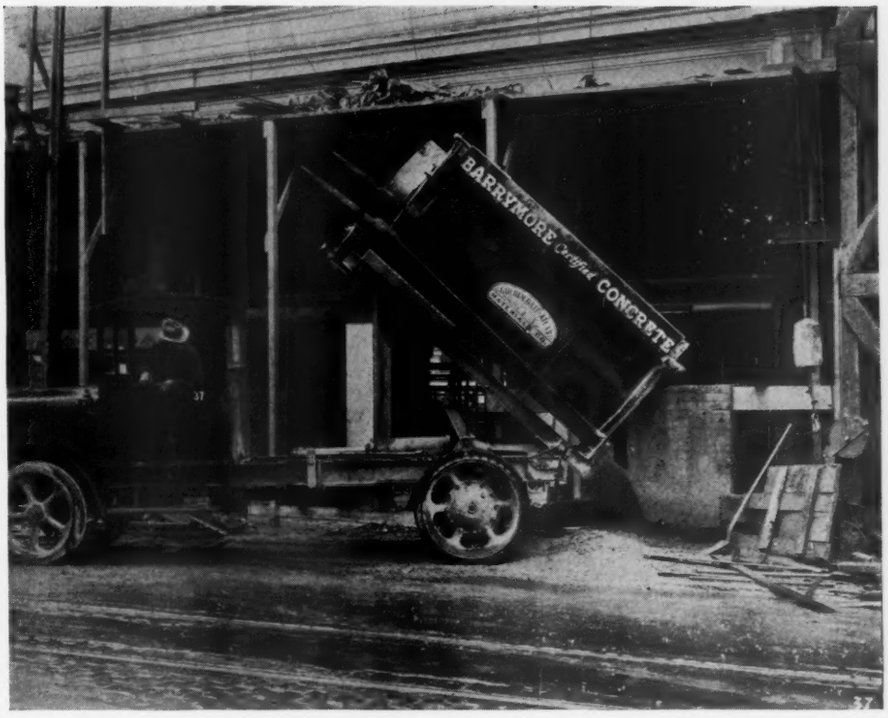
Such fundamental, revolutionary changes in concrete mixing ordinarily would be expected to call for a highly complicated and delicate mechanism—fragile, difficult of adjustment, and quick to get out of order. Quite the contrary is true of the Barrymore concrete mixer, according to its inventor's claims. In design and construction it has strength and simplicity. The machinery for delivering power to the mixer is as simple and as strong as the machinery which delivers power to the rear wheels. This simplicity results in what is termed an automatically controlled, foolproof mixer, which can be operated by any truck driver after five minutes' instruction as successfully as by the engineers who designed it.

Mixer Operation

The mixer combines all the principles of hand and mechanical concrete mixing with the principles of fine ingredient mixing as found in the central mixing plants, resulting in a combination unique in design and distinctive in its results. The mixing mechanism consists of a series of curved plowshares, spade-like blades, each overlapping the one next to it. These blades in turning lift the ingredients and spread them out on each side. They are so arranged as to cause the material to move continuously in a circle from the ends of the mixer to the center and back again, without piling up at any point. This lifting, turning, spreading and moving action not only gives every particle of sand and gravel an even coating of cement solution, but also eliminates the possibility of the larger, heavier materials being separated from the finer.

The Barrymore Concrete Mixer Corp. is a California concern with headquarters in the Hunter Dulin Building, San Francisco.

In the accompanying photographs, No. 1 shows the concrete mixer going under the bunker for a load; No. 2 shows the mixer loaded. The water is in the tanks at the sides. No. 3 shows the material mixed ready for unloading. No. 4 shows the dumping of 2½ cu. yd. of concrete at the job.



Truck dumping mixed batch on the job

Preventing Segregation of Coarse Aggregate for Concrete*

Unload in Even Layers Instead of Dumping Progressively on a Small Scale

By J. B. HUNLEY

Engineer of Bridges and Structures, Cleveland, Cincinnati, Chicago and St. Louis R. R., Cincinnati, Ohio

CONCRETE aggregates, especially the coarse ones, should be handled as well as unloaded so as to prevent segregation between the fine and coarse particles to as great an extent as is possible. The greatest segregation occurs when the stock pile is large and high; and in such cases where the material is handled by a clamshell, the best method seems to be to store it in thin layers over the entire base of the pile rather than to start with a small pile and heap it up. The principal objective should be to prevent, as such as possible, the material rolling or falling any great distance when it is stored or handled.

This Can Usually Be Minimized by Care in Unloading

By BRIDGE ENGINEER

Since the proper proportioning of the fine and coarse aggregates may double the strength of concrete, it is important to prevent to the greatest possible extent segregation of the larger particles of the stone or gravel when this material is unloaded. When the material is unloaded by building up a high conical pile with a clamshell there is a tendency for the larger particles to roll down to the edge of the pile, with the result either that considerable work must be done to secure a proper proportion of the large and small particles, or that the material is used without such proportioning, resulting in inferior concrete.

Where the materials are unloaded by shoveling out of cars this segregation can be limited by a little leveling off of the material as it is unloaded, since there is little segregation when the piles are small. Where a clamshell is used the segregation can be kept at a minimum by unloading over the whole area to be occupied by the stock pile and continuing this process as the pile is built up.

*From *Railway Engineering and Maintenance*, March, 1927.

India Mica Exports Increased in Value

AN increase in the total of mica exports from India, both in quantity and value, was announced in a statement from the Department of Commerce. The full text follows:

Exports of mica from India during the fiscal year ended March 31, 1926, amounted to 96,456 cwt., which was an increase of more than 17% over the 1925 figure, according to advices from Consul William L. Jenkins, Calcutta. The mica exports during 1926 were valued at 10,416,000 rupees as compared with 10,270,000 rupees for the fiscal year 1925. (Rupee exchange was 32 cents in 1925 and 36 cents during 1926.)

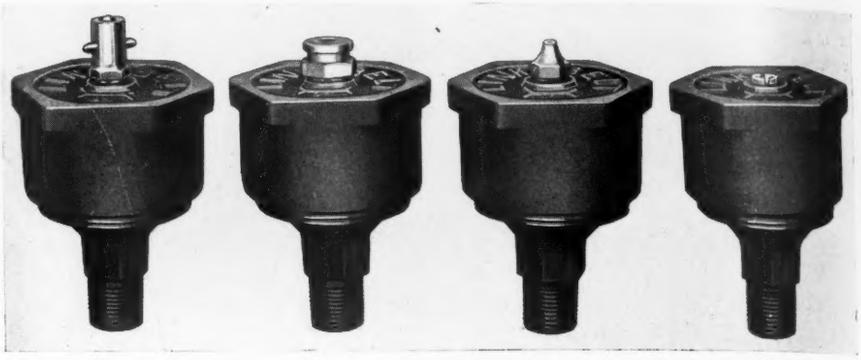
India produces from 65% to 70% of the world's supply of mica. The majority of the mica mines are located in the Hazeribagh district in the Province of Bihar and Orissa, about 250 miles from Calcutta.

New Machinery and Equipment

New Compression Grease Cup

A COMBINATION of compression grease cups with "Alemite" or "Zerk" fittings is announced by the Link-Belt Co., Chicago. The trade name "Hex-Top" is descriptive of the shape of the grease cup head, whose hexagonal design was adopted to allow easy purchase for wrenches and good grip by hand.

The combination of grease cup with forced feed filling is said to possess decided improvement over either article used separately. A particular example of its utility, the manufacturers say, is in the lubricating system of a long belt conveyor using many grease cups for the idlers. The "Hex-Top" cups are filled at one time, with a grease gun applied to the Alemite or Zerk fitting and the cap turned to a high point but not entirely unscrewed or removed. The cup thus holds a reserve of grease which can be brought to the particular bearing merely by screwing down the cap on the grease cup over the bearing, thus insuring, it is said, lubrication in the desired places and as wanted. Another advantage claimed for the "Hex-Top" head is that it allows ready filling of grease cups not easily accessible.

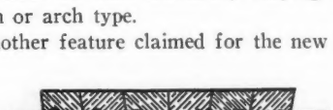


Top view of group of new malleable iron compression grease cups showing various forced feed fittings

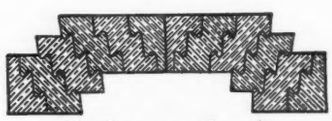
New Type of Arch Tile

A NEW type of flexible arch tile for flat, stepped or cantilevered arches in firing doors, observation doors, relieving arches of side walls, furnace or gas flue roofs, bridge walls with or without waterback, and other similar construction, was displayed by the Geo. P. Reintjes Co., Kansas City, Mo., at the recent Midwestern Power Conference at Chicago. The new tile is so constructed that it forms its own arch—requiring no temporary arch centers, skewbacks, iron or steel. Its flexibility lies in the fact that the same shapes are used regardless of wall thickness, varying span width or arch type.

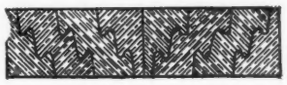
Another feature claimed for the new arch tile is that no leveling is required, as is necessary with sprung arches, the units remaining level with adjacent brickwork without any leveling medium. Each step up is equal to a brick course and the arch is built up in sections, each the width of one brick course.



Double stepped arch

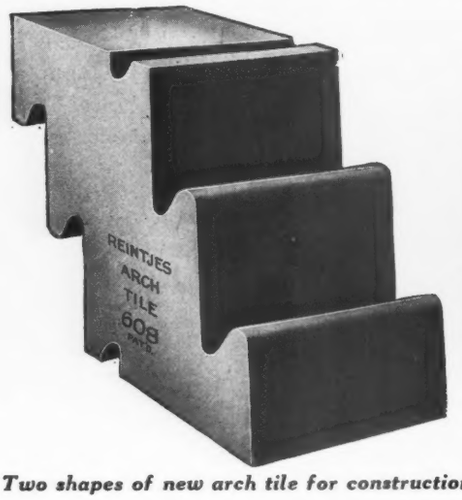


Single stepped arch



Flat arch

The tapered key design of the tile is said to facilitate repair. Replacement arches can be driven, it is said, to a tight fit without disturbing overhead brickwork, and repairs to interior sections can be made without interfering with the remaining sections.



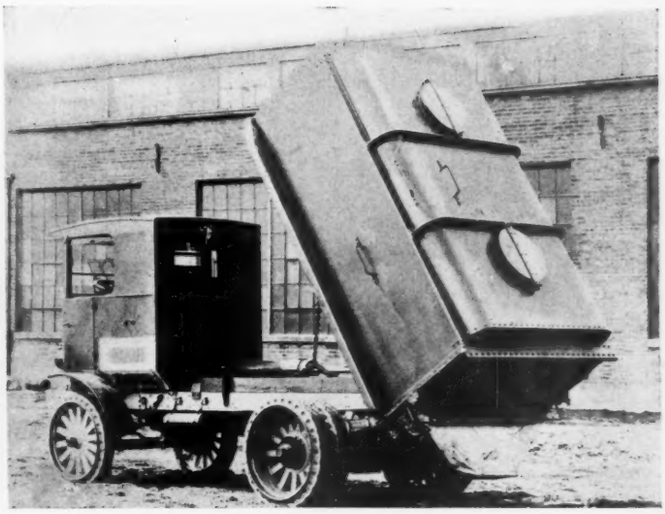
Two shapes of new arch tile for construction of flat, stepped or cantilever arches

Large Bearings for Compeb Mill

THE largest bearings ever built by the Timken Roller Bearing Co., Canton, Ohio, have just been completed and shipped, according to officials of the company. These bearings have a bore of 42 in. and an outside diameter of 61 9/16 in. At 30 r.p.m. these bearings have a rated capacity of 2,750,000 lb. The weight of each bearing is more than two tons. The bearings were built for the Allis-Chalmers Mfg. Co., Milwaukee, Wis., who will install them in what is said to be the largest compeb mill in the world. The mill, 10x9x45 ft., will be used for grinding portland cement clinker.

Large bearings recently built for compeb mill grinding cement clinker

Truck carrier for bulk cement-loading position



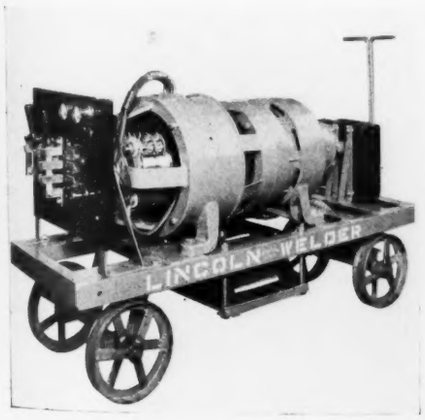
Truck in the dumping position. The manholes in the top are for filling

An advantage claimed for the use of tapered roller bearings in this machine is the material reduction of the overall length of the machine, since the width of the bearings used is only 13¼ in. In being adequately inclosed, these bearings obviate the necessity of renewing the lubricant supply except at infrequent intervals. The tapered construction of the bearing is stressed as permitting the carrying of loads, regardless of direction, without the use of thrust plates or special thrust bearings.

New Arc Welding Machine Made of Welded Steel

AN interesting innovation in machinery building, the substitution of welded structural steel for gray iron casting in portable arc welding equipment, is announced by the Lincoln Electric Co., Cleveland, Ohio. The 1927 model, 300-amp. a.c. "Stable-Arc" welder, as illustrated herewith, shows this application. There are said to be only two gray iron castings weighing about 15 lb. total on the outfit which have not been replaced with welded steel construction. Other sizes and types are being changed over to the steel construction as rapidly as possible. The motor and generator end rings, brackets and connecting ring are all made of structural angles rolled up into the proper shape and welded together. The feet of the motor generator set are made of drop forgings. The truck wheels are made of T-sections rolled on a special machine. The hub of the wheel is made of steel tube. Control panel illustrated is made of sheet steel welded together and welded to the supports.

It is claimed that the steel construction, due to the fact that it will bend rather than break, reduces the liability of failure for the reason that the bent parts may be straightened and the equipment put in operation without waiting for replacements.

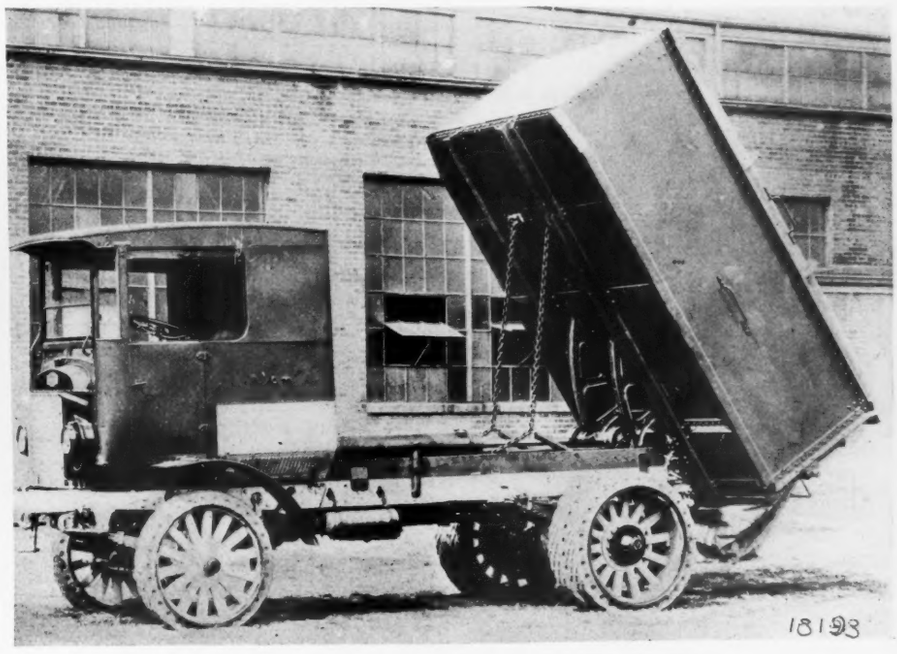


New arc welding machine with welded steel frame

Truck Carrier for Bulk Cement

AN innovation in bulk-hauling of loose cement has recently been put in practice by the Peerless Portland Cement Co., Detroit, Mich., says the *Autocar Messenger*. The new way uses a special truck body built by the Wood Hydraulic Hoist and Body Co. mounted on a 5-ton, 120-in. wheelbase Autocar chassis. The body is covered and has two manholes in the top for filling. These are protected by watertight covers. The truck is emptied through a waterproof canvas chute at the rear.

The idea is said to have worked out quite satisfactorily, the cement arriving on the job in perfect condition. No trouble in unloading has been experienced, the cement flowing freely at a 20 to 25 deg. elevation.

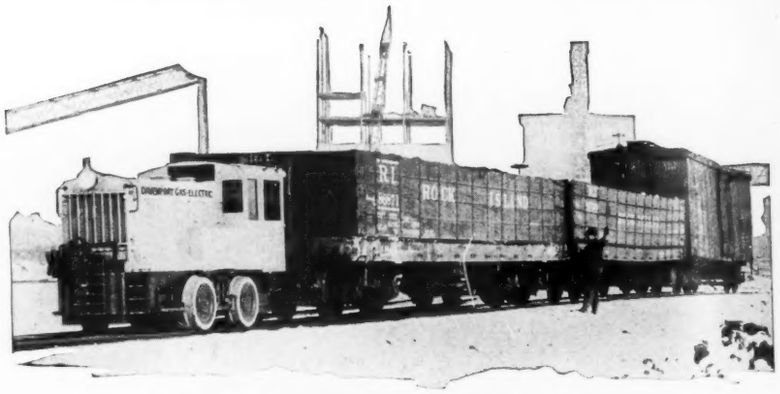


Another view of a new truck carrier for bulk cement

New Gas-Electric Locomotive for Industrial Work

A NEW gas-electric locomotive claimed to have the power and flexibility of the steam driven type and in which the mechanical clutch and gear transmission have been eliminated is announced by the Davenport Locomotive Works, Davenport, Iowa. The new machine, it is said, has distinct advantages in train starting power and switching service over steam or gasoline locomotives of the same weight.

In principle, a generator connected directly to a gasoline engine furnishes electric current for electric motors that are applied to each axle, all the wheels being drivers. Power and speed are regulated through a controller, as in a street car, and as the speed is varied instantly for starting heavy loads it is said to be impossible to stall the engine by such overload. Instant starting, smooth acceleration and close speed regulation are claimed to be obtained with these engines. This new type of motive power is said to be the most advanced step in locomotive construction ever produced for general industrial switching, yard work, quarries, cement mills, etc. This type of locomotive is made in 8, 10, 12, 16, 20 and 24 ton sizes for all track gages. The three smaller sizes have four wheels and the larger sizes have two four-wheel trucks.

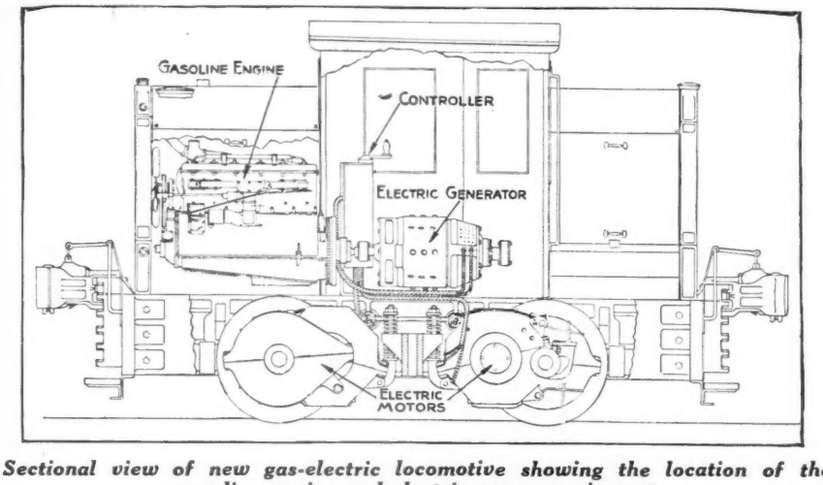


Gas-electric locomotive switching cars in yard

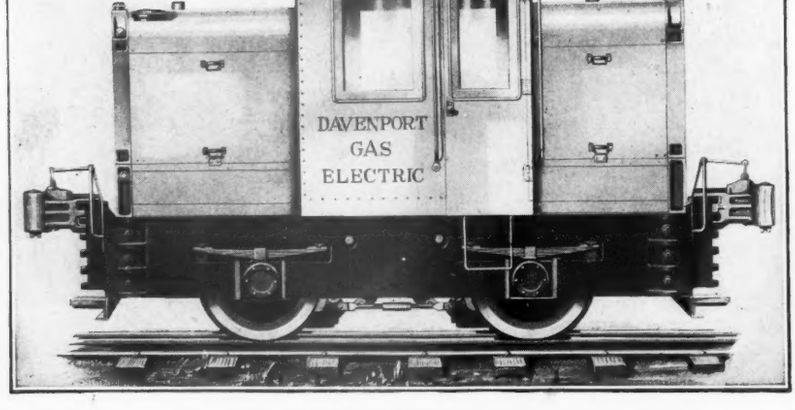
Accessibility is said to be provided in the design, unit assembly permitting removal and replacement of parts in the field. Servicing may be accomplished by any one familiar with gasoline motors and electrical equipment, the manufacturers say. The gasoline engine is said to be sufficiently large to take care of excess requirements at all speeds. Standard equipment with the engine is an electric starter, air cleaner and governor.

The electric power plant is furnished by the General Electric Co. and comprises a generator, controller and standard heavy-duty motors, whose design and control are said to be so arranged that no abnormal voltage can be developed. An infinite number of speeds as high as 35 miles per hour is said to be available. This power unit which, it is claimed, will develop up to 240 volts can be used as a source of electric power for hoists, drills, lighting outfits, wenches, etc., similar in operation to portable electric power plants.

Other advantages claimed for the machine are few moving parts, no wear or replacement or adjustment of clutch brakes, diminished operating expense, lower maintenance cost, continuous even power at all speeds, instantly available starting power and smooth acceleration, cross equalizing giving three-point suspension and self-adjusting features for all varying track conditions.



Sectional view of new gas-electric locomotive showing the location of the gasoline engine and electric power equipment



New gas-electric industrial locomotive made in 8-, 10- and 12-ton sizes for general industrial work

New Electric Hoist for Car Pulling

A NEW electric hoist that can be mounted in a fixed position, either overhead or on the ground, or can be placed on skids and used as a portable hoist, is announced by the American Engineering Co. of Philadelphia. Uses for the hoist include applications for derricks, as a car puller, mine hoist, elevator work, ash handling, coal tipples, loading booms; in general, all sorts of lifting and hauling that can be done with a hoist in a fixed position.

The standard machine consists of a smooth drum, driven by an enclosed motor through a train of spur gears, all mounted on a common bedplate. It is furnished in sizes for handling loads from 500 to 4500 lb. When desired, various modifications in the hoist can be made, such as supplying grooved drums, air motors or steam motors, push-button and remote control, holding and lowering brakes, extension shafts with additional heads, etc.

Performance of a Track Machine in Limestone Quarry*

A TRACK MACHINE made by the Nordberg Manufacturing Co. of Milwaukee, Wis., has reduced the expense of track raising and shifting by 66% at the Petoskey Portland Cement Co. plant.

This company operates a limestone quarry and a cement plant on the shore of Lake Michigan, about three miles from the city of Petoskey. The plant has an annual capacity of 1,500,000 bbl. of cement and the quarry supplies 2000 tons of rock daily when in full operation. Excess rock above plant requirements is shipped by rail to other plants.

Quarry operations were started at the lake and have worked inland several hundred feet, over a distance of about a mile. A 2½-yd. shovel loads blasted rock into 10-ton dump cars, which are hauled by locomotive to a cable hoist and then on an incline out of the quarry.

The overburden of sand and loose rock is cleared ahead of the rock operations. The overburden is carried in dump cars around the end of the quarry to a stripping dump located on the lake side of the quarry.

About 2½ miles of 60-lb. track serves the quarry, stripping and stripping-dump operations. This track is all laid on maple ties at about 2-ft. centers with tied joints. Rock and dirt ballast is used where needed.

On the stripping operations about 4500 ft. of track requires shifting four times a year. The quarry has about the same footage, shifted three times a year. The 800 ft. of dump track is raised and shifted daily when stripping is in progress.

A Nordberg track machine was put into operation in July, 1926, primarily to raise and shift the dump track, but it has been found useful for general track repair and replacement. This work is carried on during the entire year except for about six weeks of the worst winter weather.

The shifter has proved to be effective not only under normal fair weather conditions, but also under the severe conditions of early winter.

Shifting track in the quarry during December necessitated lifting track and ties, covered with snow, out of a bed of ice with water below, resulting in considerable suction on the ties during the lift. The machine had ample power. Shifting is also accomplished on frozen ground without difficulty.

Lateral shifts run generally about 20 ft., but 30-ft. shifts are often required on stripping operations. With the machine, a lateral shift of about 2 ft. on 10 to 15 ft. of track has been found to give the best production. The length of track moved is increased under favorable conditions.

With one operator and a helper for throwing switches and aligning, the shifter will move 1000 ft. of track a distance of 20 ft. in ten hours. The helper is not required to operate the shifter. Three men follow the shifter, ballasting and filling.

In addition to normal use, the unit has been found well adapted for hauling rails and ties direct to the job. Formerly trucks or trains brought this material as close to the work as possible and the track gang carried it to position. No equipment other than the track shifter is now required for any ordinary movement of material.

Operating costs of the shifter are shown in a following table. Fixed charges on the basis of 270 operating days average $3.09 a day. This includes an allowance of $300 a year for repairs and maintenance, based upon the unusually hazardous character of the working conditions. Including gas, oil and labor, the total daily operating cost including the time of two men is $12.99. With the labor for ballasting and filling the total daily shifting cost is $23.49.

An average day's work is 1000 ft. of track shifted 20 ft., aligned, leveled and ballasted, and is done at a cost of $0.12 per 100 lin. ft. per ft. of shift.

Before purchasing this machine the track gang, for shifting and ballasting in, consisted of an average of 20 laborers. The day's work was about the same as that of the machine. The daily labor cost was $70, or an average of $0.35 per 100 lin. ft. of track per ft. of shift.

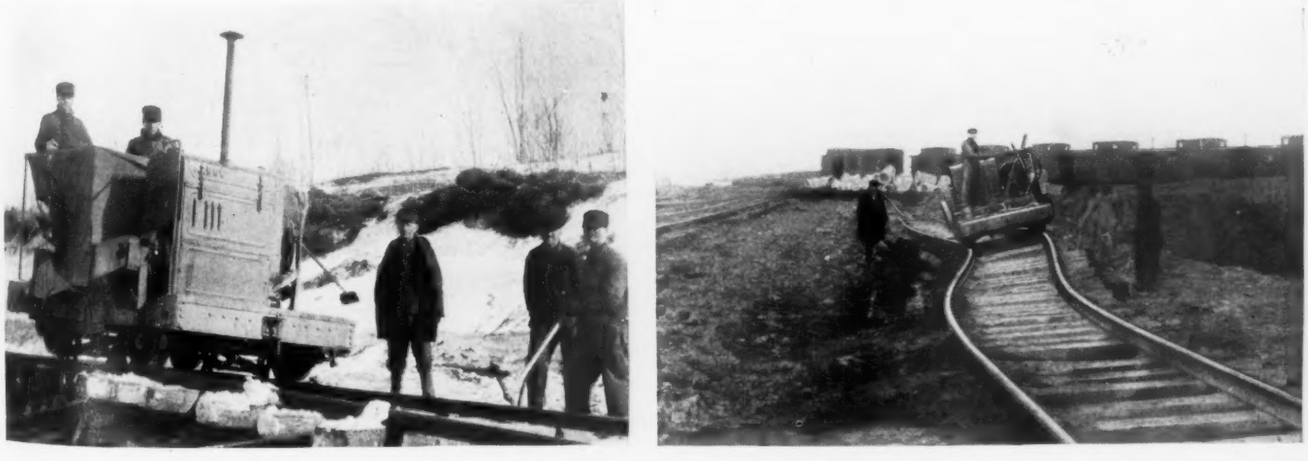
The track machine has effected an average reduction in shifting cost of 66%. The daily saving over hand labor is $46.51.

TRACK SHIFTING COSTS
TRACK MACHINE VS. HAND LABOR

Cost with track machine	
Annual fixed charges:	
Depreciation—$4,000÷10-yr. life	$ 400.00
*Average interest at 6%— 11/10×$4,000×.06/2	132.00
Maintenance and repair allowance	300.00
Total	$ 832.00
Daily operating cost (10-hour day):	
Daily fixed charges—$832÷270 days	$ 3.09
Gas (689 gal. in 70 days)— 10 gal. at $0.22	2.20
Oil—1 qt. at $0.20	.20
Grease—negligible	.....
Labor—operator at $4, helper at $3.50	7.50
Total cost of operating shifter	$ 12.99
Track gang for leveling and ballasting 3 men at $0.35×10 hours	10.50
Total daily cost of shifting track	$ 23.49
Unit cost:	
Average day's work—1000 lineal feet shifted 20 ft. and aligned, leveled and blocked or tamped ready for service.	
Cost per 100 lineal feet per foot of shift—$23.49÷(10×20 ft.)	$ 0.12
Cost of hand shifting	
Daily cost:	
Regular track gang— 20 men × 10 hours at $0.35	$ 70.00
Unit cost:	
Average day's work—1,000 lineal feet shifted 20 ft. and made ready for service.	
Per 100 lineal feet of shift— $70÷(10×20 ft.)	0.35
Saving effected with track machine	
Per day—$70—$23.49	$ 46.51
To date—70 operating days—70×$46.51	3,255.70
Per minimum year of 200 full operating days—200×$46.51	9,302.00
Reduction in shifting cost	66%
First reduction is returned in 80 operating days.	

*Allowing for interest earned by depreciation reserve.

*Survey made by the A. C. Nielsen Co., engineers, in collaboration with and approved by E. C. Switzer, general superintendent, Petoskey Portland Cement Co., Petoskey, Mich.



Track machine and crew shifting track in limestone quarry

News of All the Industry

Incorporations

Lensch Sand and Gravel Corp., Yonkers, N. Y.

Feldspar Products Co., Dover, Del., $50,000. Deal in mineral lands.

Central Mixed Concrete Co., Portland, Ore., changed to Meyers & Co.

The Dalles, Oregon, $10,000. Deal in crushed rock. C. G. Hedges, manager.

Athens Gravel Sand Co., Athens, Greene county, N. Y., $15,000. By M. V. Ryan of Albany.

Independent Block and Cement Co., Indianapolis, Ind., filed certificate of final dissolution.

Scranton Cement Products Co., Scranton, Penn., $12,000. By John B. Burleigh of Dunmore.

Hammond Gravel Co., Inc., Hammond, La. By Harry A. Black, Chas. Black and J. E. Rogers.

Ebersol Engineering Co., Inc., changed to Huntington Crushed Stone Co., Huntington, Penn.

Western Gravel, Ltd., 313 Standard Bank Bldg., Vancouver, B. C., $100,000. Deal in sand, gravel and cement.

Eureka Limestone Co., Asheville, N. C., $100,000. By H. Fleming, C. E. Bonesteel and L. Blenkinsopp.

Colorado Sand and Gravel Co., Denver, Colo., $10,000. By Carl H. Routh, R. B. Mayo and Q. R. Lilyard.

Grant County Gravel and Sand Co., Marion, Ind., increased its capital stock from 250 shares no par to 750 no par.

Tidewater Gravel Corp., Richmond, Va., $50,000. By Sherlock Bronson, D. J. Mays and M. L. Waddill, all of Richmond.

Ulster Davis, Inc., Rensselaer, N. Y., $200,000. Boating business, sand, gravel, stone, etc. By U. Davis, 6 Aiken Ave.

Victory Gravel Co., Shreveport, La., has been incorporated in Arkansas, at Texarkana, for $72,000. (Will Steel, agent for service.)

Edward Lutz Sand and Gravel Co., Milwaukee, Wis., $80,000—800 shares at $100 each. By Edw. F. Lutz, Otto V. Lutz and Alf. L. Berglund.

Tulsa Stone and Gravel Co., Tulsa, Okla., $10,000. By A. F. House, Gertrude House, Tulsa, and E. R. Jone, 706 Surety Bldg., Muskogee.

Nelson Concrete Stone Co., Raspeburg Sta., Baltimore, Md., $25,000. By John W. Nelson, Belair Road; John J. Wanicek, 100 Bushman Ave.

Cox Lime, Stone and Lima Products Corp., Wilmington, Del., $70,000 and 10,000 shares no par. Deal in stone and lime. (Corporation Trust Co. of America.)

Riverside Quarries, Inc., Pasadena, Calif., $500 and 750 shares common stock. By N. J. Shupe, Pasadena; Charles A. Goodale, Perris; Robert L. Newby, Pasadena.

Midland Gypsum Co., Billings, Mont., $100,000. Carry on general mining operations. By Fred Whiteside, Great Falls; G. C. Thompson, Billings; Fred Soular, Bridger.

Brant Sand and Gravel Co., Ltd., Toronto, Canada, $160,000. Carry on the business of quarry masters, stone, sand and gravel merchants, manufacture and sell lime, etc.

Interlocking Brick Co., Boston, Mass., $25,000—1000 shares preferred at $25 each; 500 shares common, no par. By Harry Sharpe, Louis G. Bragdon and Robert C. Murray.

Sunset Rock Products Co., Los Angeles, Calif., $200,000. By W. D. Frederick, Pomona; Richard W. Clark, Frank W. Clark, Percival E. Woods and Walter I. Lyon, Los Angeles.

Kent Sand and Gravel Co., Grand Rapids, Mich., increased capital stock from $50,000 in ccmmon to $50,000 preferred and 50,000 shares no par value. Gilbert A. Honke is president.

Orange Cement Block Works, Inc., Orange, N. J., 1000 shares no par. Deal in concrete. By Antonio, Phillip A., George A. and Joseph J. Amabile. (Attorney, Abraham M. Herman.)

Bergen Sand and Gravel Co., East Paterson, N. J., $125,000. Deal in building materials. By Charles Roth, Adam L. Roth and Louis F. Fournier. (Attorney, James H. White of Hackensack.)

United Cement Products Corp., Indianapolis, Ind., $20,000 preferred and $30,000 common stock. Deal in septic tanks and cement products. By Anna L. Jones, William W. Hammond and C. Severin Buschmann.

Standard Concrete Block Co., Inc., Worcester, Mass., 200 shares no par. Deal in concrete, cement, etc. Chas. A. Scarone, president; William F. Brennan, 9 Innwood Rd., Worcester, treasurer, and Walter D. Brennan.

Dubuque Stone Products Co., Dubuque and Eagle Point, Iowa. Increased capital stock from $100,000 to $200,000.— $50,000 preferred and $150,000 common stock. Deal in crushed rock, cement and limestone. G. D. Rose and Paul N. Nauman.

Clear Lake Sand and Gravel Co., 719 N. Grand Ave., West Springfield, Ill., $15,000. Pump, extract and produce sand, gravel and crushed rock. By Edgar M. Clark, C. B. Denkert, Henry Wenneborg. (Correspondent: J. B. Weaver, Ferguson Bldg., Springfield.

Kelletto Products Co., 11 S. La Salle St., Chicago, Ill., 1000 shares no par. Quarry, finish, sell and set marble, granite and stone of all kinds. By Otto Kell, William D. Hardee, Albert L. Norman and Wallace Davis. (Bartel & McCormick, suite 1834, 11 S. La Salle St.)

Pacific Portland Cement Co., San Francisco, Calif., $30,000,000. With the following directors: Herbert Fleishhacker, J. A. McCarthy, John S. Drum, Milton H. Esberg, M. D. L. Fuller, W. F. Detert, William F. Humphrey and John D. McKee, San Francisco; Robert B. Henderson, Burlingame; Alexander Hamilton, Ferdinand Reis, Jr., and John Sutton, Menlo Park; Fred T. Elsey and William F. Draycott, Oakland, and F. D. Madison, San Rafael.

Quarries

Missomo Quarry Co., Auxvasse, Mo., recently sold a half interest to S. T. Harrison, Duluth, Minn., who will act as superintendent of plant.

Auxvasse Quarry Co., recently organized, is reported, took over the holdings and leases of Mississippi, Ohio, Missouri River Basin Mineral Products Co.

Hoffman Bros. & Wilson, Harrisburg, Penn., report daily deliveries of crushed stone for general building in excess of 200 tons per day. Crushing operations running 65% of capacity, stock on hand about 6000 tons for future rush orders. Crushers turning out 300 tons per day.

Atlas Rock Co., Oakland, Calif., Fred Beerman, manager, has resumed operation after overhauling and installing new equipment. They have installed a Symons cone rock crusher, 100 tons per day capacity.

Union Rock and Land Co., 1403 E. 16th St., Los Angeles, Calif., is to construct $25,000 rock storage bunker at 9861 San Fernando Road.

Southern Limestone Co., Harriman, Tenn., will open new quarry this month.

Brady, Texas, is reported, will soon have a rock crushing plant. A 75 yd. per day capacity jaw crusher with motor and screening equipment have been purchased by D. J. Wood of this city. Contracts have been received for crushed stone to be used by the city for paving streets.

Dallas Marble and Granite Co., Dallas, Texas, recently purchased North Texas Marble and Granite Works. Additional capital will be added.

Sand and Gravel

Ottawa Silica Sand Co., Ottawa, Ill., is reported to have purchased 38 acres of sand and mineral deposits adjoining its present property, for the stated sum of $38,000 or $1,000 per acre.

Union Rock Co., Los Angeles, Calif., is reported, shipped large consignment Southern California sand to Hillgartner Marble Co.'s branch in Honolulu, Hawaiian Islands.

George Hardenleigh, Seattle, Wash., formerly with Grant Smith Co., is reported, purchased gravel pit near Renton from Elmer McDonald. Expects to erect sand and gravel conveyor.

Frank Lanning, Harvard, Ill., expects to erect sand and gravel plant on lot recently purchased, found to contain deposit.

Geo. H. Palmer Co., Inc., Box 4117, Miami, Fla., to rebuild plant, 60x80 ft., corrugated iron, cost about $10,000; install machinery including motors, shafting and machine shop equipment, $20,000. Daily output 600 yd. rock and sand.

Boice Bros., Pontiac, Mich., announce their consolidation with the Pontiac Brick Co., also that after May 1 they will carry complete line of builders' supplies excepting lumber.

Marshfield, Ore. The county court at this place is considering installing necessary machinery at a gravel pit on the Coquille river, purchased some years back, to produce material for county roads.

R. H. Eastwood Sand and Gravel Works, Grayville, Ill., has resumed operations.

Umpqua Dredging and Construction Co., Reedsport, Ore., is reported recently organized. Docks, bunkers, dredging apparatus and railroad spurs completed, report also states that car can be loaded from bunker in 15 minutes.

Spicer Gravel Co., Marseilles, Ill., is reported to have added new machinery and equipment last year, also just added another International truck.

Hazelton Gravel Co., Hazelton, Ind., is reported sold at auction, receiver's sale, March 31.

Penglase Engineering Co., Grayville, Ill., is reported reorganized recently. A group of Grayville stockholders taking the place of the Indiana people financially interested. George H. Penglase, G. D. Negley, F. R. Bowman, J. C. Blood, C. F. Speck, F. E. Rigall and W. L. Skiles constitute the officers and board.

Colonial Sand and Stone Co., New York City, N. Y., is reported to have augmented their motor truck fleet by an order for 32 Pierce-Arrow model RF dump trucks, making a total of 95 dual-valve units.

Silica Sand

National Plate Glass Co., Ottawa, Ill., is reported to have purchased a 12-acre tract of sand deposit land here.

Lime

Batesville White Lime Co., Batesville, Ark., George T. Weigert, general manager, is planning the future addition of kilns.

Limestone Products, Inc., Ocala, Fla., J. G. Hall, president, general manager, completing erection of 500 to 600 ton per day crushing plant and will soon construct modern steel vertical shaft kiln and up-to-date hydrating plant.

Black Marble and Lime Co., Enterprise, Ore., reports construction of new kilns to be ready by August.

International Lime Co. is reported to have transferred $100,000 worth of property and equipment in Whatcom county, Wash., to Olympic Portland Cement Co. recently.

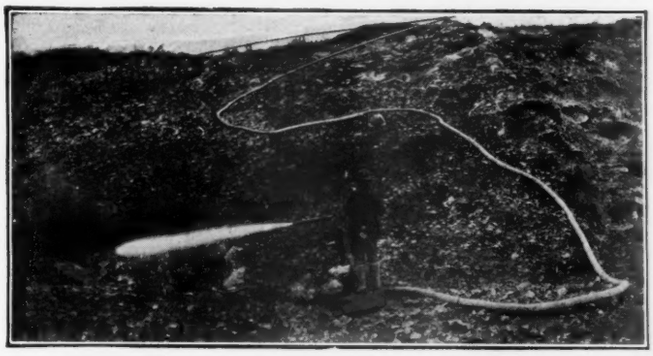
Agricultural Limestone

Prof. E. C. Carter, Missouri College of Agriculture, speaking at Mountain Grove, Mo., urged more extensive use of limestone for soil conditioning, suggested the installation of community crushers where it was difficult or expensive to bring in.

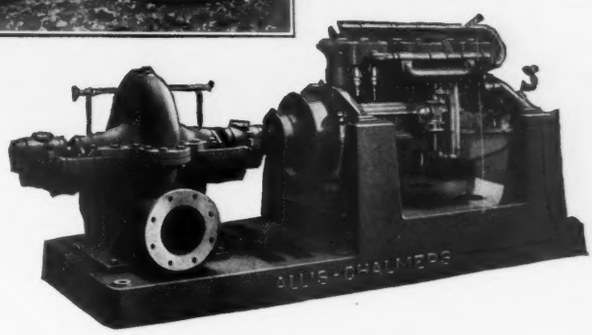
Michigan Limestone and Chemical Co., Inc., in co-operation with Medina, Mich., Advertising Club, celebrated "Limestone Day" April 11, for the purpose of stimulating farmer interest in this section.

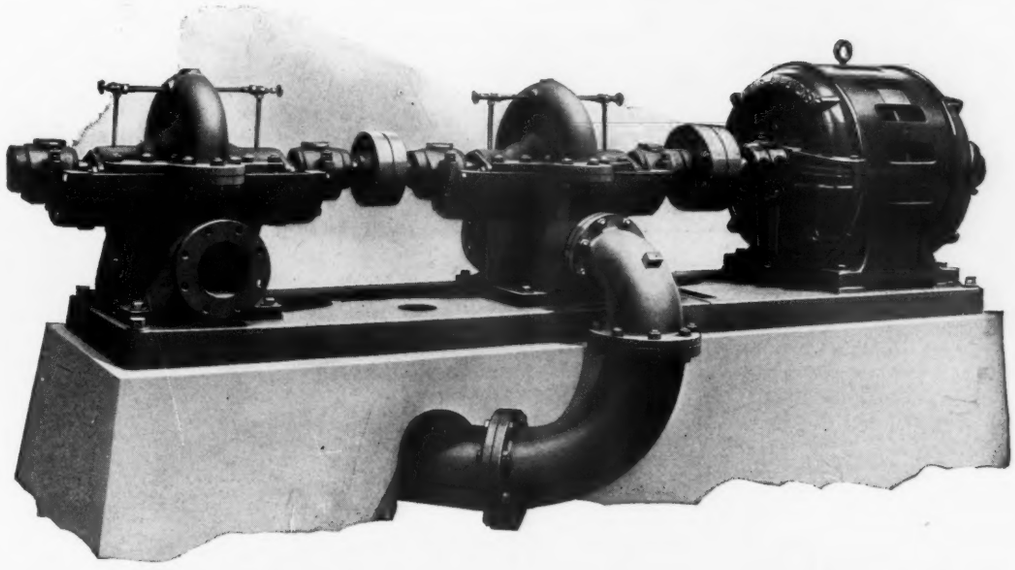
Smith-Hughes Vocational Schools, Kingston, Ark., students have purchased limestone pulverizer with Fordson tractor for power to produce agricultural lime. Contracts for 600 tons have been taken, expect others for 1000 tons or more soon.

Centrifugal Pumping Units
for
The Rock Products Industry



Six Allis-Chalmers 10-in. pumps with 200 H. P. motors have successfully and economically helped build sand dams for the Northern New York Utilities Company; two Allis-Chalmers gasoline engine driven pumps were used on an earth fill dam at Asheville, N. C., for pump sluicing. Other Allis-Chalmers pumping units are removing overburden from gravel; still others are elevating, washing and conveying gravel. Our complete line of pumps with most any kind of drive required allows us to furnish the suitable pumping unit for most any requirement in the rock products industries. Write for Bulletin 1632-I.





ALLIS-CHALMERS
MILWAUKEE, WIS. U. S. A.

Lime, Ore. J. J. Quinlan, prison superintendent of industries, Lime, Ore., reports that 2760 tons of lime rock were received at the prison between April 15 and December 17, 1926. Lime rock pulverized and sold totaled 2667 tons, all of which was sold to Oregon farmers. Of this tonnage 1570 tons was delivered by truck, or called for and delivered. Rail shipments totaled 1096 tons. Insufficient storage capacity is said to have reduced the production by about 40 cars during the period.

Bates county, Missouri, farmers are reported heavy users of crushed limestone for soil improvement, more than 300 tons having been shipped in in two weeks.

Gypsum

United States Gypsum Co., Chicago, Ill., announced recently it had used over 1,000,000 agate lines of newspaper advertising space throughout the country for its dealer campaign during the first two months of 1927 and estimates that this figure will go well over 3,000,000 lines at the close of 1927.

Cement

Trinity Portland Cement Co., Houston, Texas, installing new kiln, costing $168,000, at their plant here, also erecting $100,000 warehouse, take care increase in business due to large building operations in this section.

Lawrence Cement Co., Siegfried, Penn., is reported planning construction $5,000,000 plant at Rockland, Maine. Completion of plant, with capacity 1,000,000 bbl. per year, with doubled output if necessary, employing 400 men for construction and 200 operating crew, is contemplated within a year.

Northwestern Portland Cement Co., Portland and Seattle, Wash., is reported calling bids for an 80x100-ft. steel and concrete storage shed, with ultimate reported length 1200 ft., for their Grotto, Wash., building program. Other units to follow include grinding room, slurry tanks, packing room, storage silos and a tramway to convey rock from quarry to elevator, a distance of 8000 ft. A 2½-yd. traveling crane is also included with the first unit.

Cement Products

Southern Cement Stone Co., Brunswick, Ga., has been reorganized and will begin operation soon with C. E. Warndoff in charge.

Arkansas City, Ark., has new plant for manufacturing building tile, sewer pipe, fence posts and drain tile. Production will start in a short time. C. C. Hawkins, president of the Tennessee-Arkansas Gravel Co., holds the same position with the new company, and Louie Reitzammer is secretary and manager.

Nashville Concrete Pipe Co., Nashville, Tenn., announces the signing of contract with National Stone-Tile Corp., securing the manufacturing agency for "stone-tile" hollow concrete brick in Nashville and adjoining territory. Equipment and preparation for new plant is completed and production being rushed.

Huppert Concrete Block Factory, Dale, Ind., has started operation and reports orders on hand to keep busy until next fall.

La-More Tile Co., Birmingham, Ala., has new plant at 2307 29th Ave., N., for manufacturing patented interlocking building tile, made of cement and slag. Samuel J. Hutchinson is manager.

Shore-Line Builders, Inc., Ojus, Fla., reported manufacturing reinforced concrete units used in constructing seawalls and bulkheads. Two bulkheading contracts in Biscayne Bay have been received.

Gulf Concrete Pipe Co., Houston, Texas, plans $100,000 plant for manufacturing sewer pipe at Brownsville, Texas, it is reported.

Alamo Concrete Pipe Co., San Antonio, Texas, has completed its plant at 1231 Hoefgen Ave. and is reported to have received an order for about 10 mi., concrete pipe, for sewer job in this city.

Crafstone Co., 20 Government St., Asheville, N. C., let contract for addition to plant; will be 50x128 ft., concrete floors, built-up roof, daily output 35 tons architectural trim stone.

Hay & Peabody Cement Vault Co., 282 Somerville Ave., Watertown, Mass., let contract for a two-story plant, 90x170 ft., for manufacturing cast cement products, to cost about $50,000 with equipment.

Curtis and Otis Frost, Jerseyville, Ill., are building addition, 32x50 ft., to their concrete manufacturing plant, for use as storeroom and display for concrete vaults.

Cotter Bros., San Antonio, Texas, recently completed mortar plant at the Mission Wood and Coal Yards.

Talc

Mariposa County, California, talc deposits at Bagby, owned by Herbert Shaw of Sonora and J. A. Crounse of Columbia, are reported very valuable.

Rock Phosphate

Rock Asphalt Co. of America reported merged with United Rock Asphalt Co., giving it a combined daily output of 3000 ton. Wm. E. Massey, chairman of board; Fred T. Fitzharris, president; J. D. Kelley, treasurer; Fred H. Mertens, secretary, with headquarters at Louisville, Ky.

Miscellaneous Rock Products

Asbestos Shingle, Slate and Sheathing Co., Ambler, Penn., announces the incorporation under Cuban laws, the Ambler Asbestos Co. of Cuba, at Havana, to handle the sale of Corrugated Asbestos roofing, asbestos shingles, tile and other asbestos building materials. Dr. R. V. Mattison, Royal Mattison, Robert J. Lewis and others.

Casper, Wyo., through G. R. Hagens may develop and mine asbestos deposits on Casper mountain. Efforts are being made to direct interest along these lines through the Chamber of Commerce, it is reported.

Bell County, Texas. Samples of bentonite recently uncovered at this place are reported to have been sent to the bureau of economic geology, University of Texas, for further investigation.

D. S. Stainback, Germantown, N. C., is developing 70-acre tract of bentonite in Stokes county.

Obituaries

Ferdinand A. Rabe, sales manager of the Atlas Portland Cement Co.'s Cincinnati office in the Temple Bar Bldg., died at his home, Ft. Mitchell, Ky., March 24, of pernicious anemia.

Personals

Charles H. Cox, sales manager, Phoenix Portland Cement Co., Philadelphia, recently was guest of Lindley C. Morton, president, Phoenix Portland Cement Corp., while in Birmingham to inspect the company's new plant.

J. N. Chisholm, Birmingham, Ala., has been appointed cashier for the Phoenix Portland Cement Corp.

Sewell L. Avery, president, United States Gypsum Co., has been appointed to the advisory committee the National Fire Protection Association in their campaign for $500,000 fund to combat fire waste.

Frank A. Smith and Walter E. Bowe, president and sales manager, Lawrence Cement Co., Siegfried, Penn., were the guests recently at a luncheon given by Andrew J. Peters, president, Boston Chamber of Commerce.

J. M. Portugais has joined the staff of the Canada Cement Co., Ltd., Montreal, as technical engineer. He is a recent civil and electrical engineering graduate of Ecole Polytechnique, Montreal, and of late has been connected with the Quebec Stream Commission, Shawinigan Engineering Co., Southern Canada Power Co. and Montreal Water Board.

W. S. Hovey was recently elected president of Fairbanks, Morse & Co., Chicago, succeeding C. H. Morse, who became chairman of the board. This is the first time this position has been held by a man not of the original Morse family.

W. S. Hovey

Born in 1875, a graduate of Cornell, Mr. Hovey joined the Sheffield Car Co., an affiliation of Fairbanks-Morse, in 1902, as assistant superintendent. Later he became superintendent, which position he held until 1913, when he was transferred to the Beloit works of Fairbanks-Morse as manager of the engine division. A few months later, saw him general manager of that plant. In 1919, Mr. Hovey was elected vice-president in charge of all the manufacturing activities of Fairbanks-Morse and in 1924, was made general manager of the entire business.

Walter E. Moore, Jr., has been appointed sales manager for the Consumers Rock and Gravel Co., formerly connected with Union Rock and Gravel Co., Los Angeles, Calif.

W. J. Van Valkenburg, formerly with the Blue Diamond Co. and the Reliance Rock Co., has been appointed sales manager for Union Rock Co., Los Angeles, Calif.

Charles A. Porter, vice president and general manager of the Lawrence Portland Cement Co., is in Rockland, Maine, where the company will erect a plant to supply New England demand. Mr. Porter has been commissioned by the board of directors of the company to oversee the erection of the new plant, whose operation will be under his supervision, same as that at Northampton.

Manufacturers

Lincoln Electric Co., Cleveland, Ohio, announces that the American Society of Mechanical Engineers has accepted the custody of $17,500 given by the company to be awarded under the rules of the competition to those contributing the best three papers disclosing new information that will tend to advance the art of arc welding. The awards will be presented at the stated 1928 spring meeting of the society. All communications in regard to rules, etc., should be addressed to the secretary of the society, C. A. Rice, at 29 W. 39th St., New York City.

Harnischfeger Sales Corp. announces the appointment of George W. Gimlich as manager of the Houston, Texas, branch, succeeding D. J. Murphy, who will open a new office at Baltimore, Md.

Shepard Electric Crane and Hoist Co., Montour Falls, N. Y., has taken over the entire Sprague portable hoist business of the General Electric Co., Schenectady, N. Y. The Shepard company will continue the manufacture of this line and has established for this purpose a division known as the Sprague hoist division of the Shepard Electric Crane and Hoist Co., with offices at 30 Church St., New York City. N. A. Hall, of the General Electric Co., will take charge of the new Shepard division, after 14 years of service with the General Electric Co.

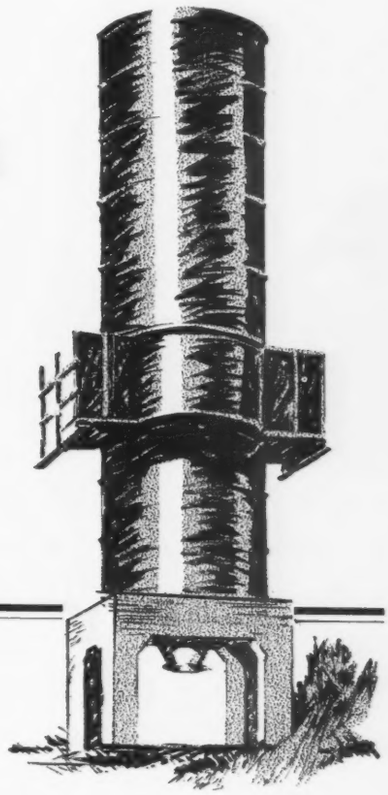
The Shepard company will furnish spare parts for obsolete types of Sprague hoists as well as for the current line. The General Electric Co. will continue to manufacture the parts for motors which have been used on Sprague hoists, and parts for controllers and brakes, but this business will be handled commercially by the Shepard Co.

The Marion Steam Shovel Co., Marion, Ohio, has entered into an agreement with Ransomes & Rapier, Ltd., London, Eng., whereby the latter company will build Marion excavators for sale in Great Britain, the British Empire, Indian Empire, Africa and continental Europe.

High Efficiency - - - Low Fuel Costs

The lime industry is fully justified in placing complete confidence in the "Arnold" Vertical Kiln. It is the product of years of study and experiment on the part of Arnold & Weigel engineers who have devoted their best efforts to the betterment of lime producing practices.

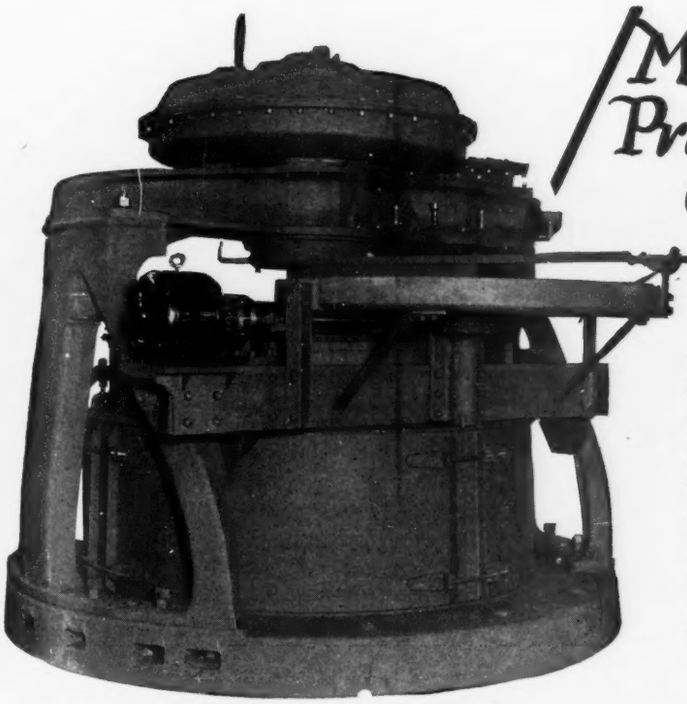
In ratio of fuel costs to lime burning efficiency, the "Arnold" Kiln is unsurpassed. In every respect it is thoroughly abreast of the industry's latest developments. Let us help you with your lime producing problems.



ARNOLD & WEIGEL

Contractors and Engineers

WOODVILLE - - - - - OHIO



Modern Grinding Practice calls forth The New **HERCULES**

It was bound to come. The cement industry had sounded the call and the New Hercules was the answer. Bradley Mills have been almost universally used in the cement industry for many years, and as a result of their sterling performance have won the confidence of all those who have used them. The New Improved Hercules is an adaptation of proven principles to the present day practices in cement grinding. In every detail, it is a present day machine for present day needs. Drop us a line and we'll be glad to tell you in detail about the many improvements that have lifted the New Hercules far above the ordinary.

BRADLEY PULVERIZER COMPANY

Boston **London** **Works: Allentown, Pa.**

The Bradley Hercules Mill as a preliminary machine, with a straight tube mill as the finisher, permits of double stage reduction and a finer product with minimum power costs.

Bailey Meter Co. has been organized to acquire the flow meter business and patents of the General Electric Co. and the fluid meter and combustion control business and patents of the present Bailey Meter Co. The engineering, manufacturing and sales organization of the present Bailey Meter Co. will be retained by the new company, with the increase in personnel necessary from the General Electric Co. to handle properly the additional business. The new company will have its factory and general offices in Cleveland, Ohio.

E. G. Bailey, president of the old Bailey company, will be president of the new company, and R. S. Coffin, vice-president of the old Bailey company, will be vice-president in charge of administration and finances. R. E. Woolley, now connected with the General Electric Co., will be vice-president in charge of engineering and sales. The new Bailey Meter Co. will offer a complete line of flow meters, boiler room instruments and combustion control equipment.

Novo Engine Co., Lansing, Mich., has appointed H. E. Erickson Co., 114 South Third St., Minneapolis, Minn., exclusive distributors for its equipment in the north central territory.

Manganese Steel Forge Co., Philadelphia, Penn., announces the opening of a new office at 407 South Dearborn St., Chicago, Ill. W. H. Potter, for the past year connected with the main office of the company in Philadelphia, will have charge of the Chicago office, serving the states of Illinois, Indiana, Iowa, Wisconsin and Minnesota.

Lincoln Electric Co., Cleveland, Ohio, announces the following changes in its sales personnel: G. N. Bull, formerly with the Worthington Pump and Machinery Co. in their Washington, D. C., office, has been made district manager of the New York office of the Lincoln company; C. S. Freeman, formerly in charge of the Lancaster office, has been transferred to the Buffalo office and made district manager; S. W. Shultz, formerly of the Philadelphia office, has been put in charge of the Lancaster office, and Ed J. Pfister, formerly of the Buffalo office, has been transferred to the Philadelphia office.

Climax Engineering Co., Clinton, Iowa, announces the appointment of the following new dealers: Hunter Machinery Co., Milwaukee, Wis., for western Michigan, selling through their Grand Rapids, Mich., office; Belknap Hardware and Manufacturing Co., Louisville, Ky., handling sales in Kentucky, northern Tennessee, West Virginia and portions of North Carolina and Virginia, and Woodward-Wight Co., New Orleans, La., for southern Louisiana and southern Mississippi.

Triumph Electric Co., Cincinnati, Ohio, has made the following changes in its sales organization: O. L. Rimoldi, district manager, New York territory, with headquarters at 844 Woolworth Bldg., New York; E. W. Martin, district manager, Chicago territory, with headquarters at room 447, 53 W. Jackson Blvd., Chicago, and F. E. Gibson, 2315 Dime Bank Bldg., Detroit, Mich., to represent the Detroit territory.

Bucyrus Co., South Milwaukee, Wis., had a rather unique exhibit at the recent National Crushed Stone Association Detroit convention. A miniature quarry with working models of two quarry shovels, one of the railroad type of less than 180 deg. swing and the other a full revolving, was shown. On the quarry face was mounted a placard giving comparative data on both types. The entire exhibit was on a scale of ¾ in. to the foot, the quarry face being 40 ft. high. The illustrations accompanying show the shovel models working in the quarry.

Hercules Powder Co., Wilmington, Del., has recently added two new films to its industrial library. The first, entitled "The Explosives Engineer," shows how explosives are tested by manufacturers and at the Bureau of Mines, and also portrays the scientific application of explosives to all classes of mining. The second film, "Hercules Electric Blasting Caps," shows the methods of manufacture and construction of electric blasting caps. These films will be loaned without charge and sent postpaid to anyone desiring to exhibit them, upon application to the Hercules company.

Chas. T. Topping Machinery Co., Dayton, Ohio, announces the removal of its general offices from the plant of the Smith Gas Engineering Co., Dayton, to the U. B. Bldg., Dayton, Ohio.

Triumph Electric Corp., Cincinnati, Ohio, has appointed Handlan-Buck Co. distributors in the St. Louis territory.

Fairbanks, Morse & Co. of Chicago have taken over the scale business of the Fairbanks Co. of New York, according to official announcement.

In 1916 Fairbanks-Morse purchased E. & T. Fairbanks & Co. with its scale factories at St. Johnsbury, Vt., and East Moline, Ill. The Fairbanks Co. of New York, however, held the distributing rights for Fairbanks scales in the eastern and southern portions of the United States and abroad. The present transaction, therefore, gives Fairbanks-Morse complete control of the manufacturing and distribution of Fairbanks scales. A scale manufacturing plant at Birmingham, England, as well as the London sales agency and all other sales agencies throughout the world, are included in the deal.

The Fairbanks Co. of New York will continue to manufacture valves and sundry other products at Binghamton, N. Y., and wheelbarrows and industrial trucks at Rome, Ga.

Combustion Engineering Co., New York, N. Y., announces that the Cleveland district offices of Combustion Engineering Corp., Ladd Water Tube Boiler Co., and Heine Boiler Co., have been consolidated and will be located at 1107 Guardian building. Frank Henderson is Cleveland district manager of the three associated companies.

George Haiss Mfg. Co., Inc., New York, N. Y., announces the appointment of Ralph H. Smith, Buist Ave. and Berbro St., W. Philadelphia, as representative in the Philadelphia territory.

Thew Shovel Co., Lorain, Ohio, announces the appointment of Paul Malenchini, who will take full charge of its export department. Mr. Malenchini's headquarters will be at the general office of the Thew Shovel Co. at Lorain.

L. B. Foster has opened offices in the Illinois Merchants Bank Building, Chicago. Adequate warehouse and storage yard facilities have also been provided and plants for the housing of fabricating and reclaiming machinery are in process of erection, so that a complete service can be had and shipped from this point. The Chicago office will be under the management of Reuben A. Foster, vice president of the firm.

Coe Manufacturing Co., Painesville, Ohio, is moving its Chicago office to room 1804, Morton Bldg., 208 W. Washington St. H. R. Masters will be in charge of the office and Howard Curtis, formerly of the B. F. Sturtevant Co., will assist him.

Trade Literature

NOTICE—Any publication mentioned under this heading will be sent free unless otherwise noted, to readers, on request to the firm issuing the publication. When writing for any of the items kindly mention Rock Products.

Automatic Arc Welding. Bulletin **GEA-586**, illustrating and describing electric arc welders for various purposes. GENERAL ELECTRIC CO., Schenectady, N. Y.

The Cal Book. Booklet on the use of "Cal" as an admixture in portland cement mixtures to obtain high early strength, improve curing, densifying, easy workability, hardener and for placing in cold weather. General data on properties, effects, and directions for use. NORTH AMERICAN CEMENT CORP., Hagerstown, Md.

Automatic Water Stills. Catalog A illustrating and describing water distilling apparatus for all purposes. BARNSTEAD STILL AND STERILIZER CO., Boston, Mass.

Diesel Engines. Data on 457-day non-stop run of De La Vergne Diesel engine. DE LA VERGNE MACHINE CO., New York, N. Y.

Shoe-Brake. Bulletin 1004 on the new W-B type brakes. Illustrated. ELECTRIC CONTROLLER AND MFG. CO., Cleveland, Ohio.

Portable Car Unloader. "X-Track-Tor" for removing sand, gravel, stone, etc., from hopper bottom cars without use of pit or trestle. Gasoline or electric powered. JEFFREY MFG. CO., Columbus, Ohio.

Steel Bins. Booklet describing various steel bin installations at different sand and gravel and quarry plants. DAVIS & AVERILL, INC., Newark, N. J.

Sand-Lime Brick Equipment. Bulletin describing and illustrating complete line of equipment for sand-lime brick, asbestos-cement shingles and slag-brick. KOMNICK MACHINERY CO., Detroit, Mich.

Cutting Your Shovel Costs. Bulletin illustrating and describing new Marion Type 7, one-yard convertible shovel. MARION STEAM SHOVEL CO., Marion, Ohio.

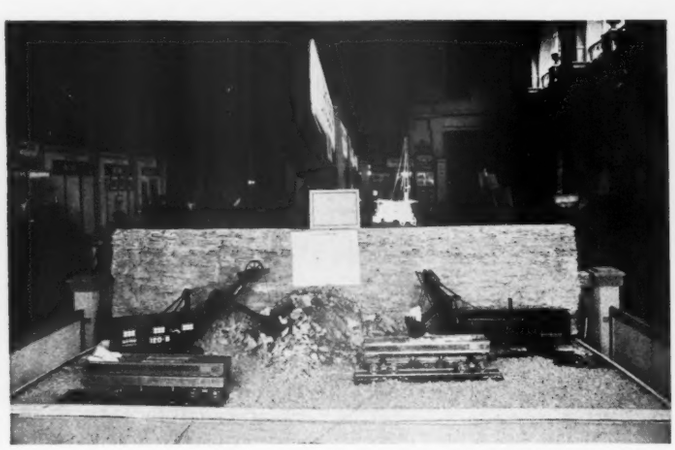
Portable Hoists. Bulletin **76-G** on Sullivan single- and double-drum, electric portable hoists. Data on design, uses, etc. Illustrated. SULLIVAN MACHINERY CO., Chicago.

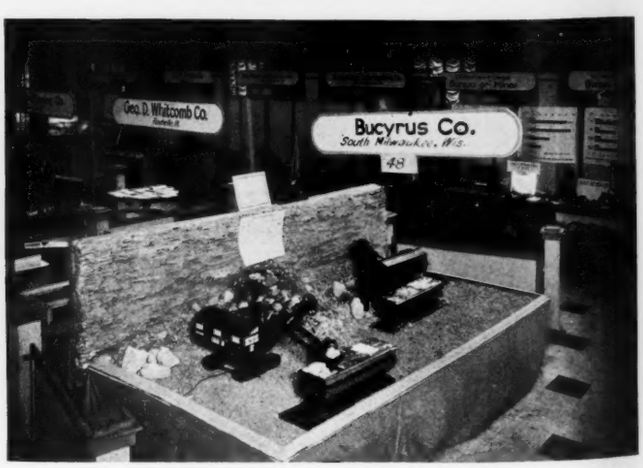
Air Compressors and Vacuum Pumps. Bulletin No. **132** describing and illustrating single stage air compressors and vacuum pumps. Features class 3-AE direct synchronous motor-connected air compressors. PENNSYLVANIA PUMP AND COMPRESSOR CO., Easton, Penn.

Excavators. Bulletin **2703** on convertible excavators manufactured by the GENERAL EXCAVATOR CO., Marion, Ohio.

Wiring Data for A. C. Motors. Data on horsepower, load, size of starting and running fuses, wire and conduit and fused or unfused switch sizes, etc. WESTINGHOUSE ELECTRIC AND MANUFACTURING CO., Chicago, Ill.

Conical rod mill. Bulletin No. **25** describing and illustrating Hardinge conical rod mill for wet or dry grinding with variable discharge level. Dimensions, capacity data, etc. HARDINGE CO., York, Penn.





Miniature quarry with working models of two types of quarry shovels exhibited at National Crushed Stone Association 1927 convention at Detroit